Subchapter 4 STREETS AND PARKING

5:21-4.1 Street Hierarchy

(a) Streets shall be classified in a hierarchy with design tailored to function. The street hierarchy definitions contained within this section are applicable only to local residential streets and are not to be considered related to the U.S. Department of Transportation, Federal Highway Administration's Functional Classification of Highways.

(b) The street hierarchy system shall be defined by road function and average daily traffic (ADT), calculated by trip generation rates from the current edition of Trip Generation by the Institute of Transportation Engineers, as indicated in Table 4.1. Trip generation rates from other sources may be used if the applicant demonstrates to the appropriate approving authority that these sources better reflect local conditions. In addition, the applicant shall investigate the opportunities for, and availability of, transit facilities and, if appropriate, consider their impact(s) on motor vehicle traffic trip generation rates per dwelling unit.

(c) Each residential street shall be classified and designed to meet the standards for one of the street types defined in Table 4.2. The entire length of the street need not be designed based on the highest ADT where the ADT varies along the street's length. However, each street segment between intersections shall be designed based on the highest ADT served in that segment.

(d) The municipality and the developer shall determine the highest order street required to be used in a given residential development, considering all of the following:

1. The size of the development (number and type of units). For example, using size to determine the highest order of street required, a development of up to 150 single-family detached units would not require any minor collectors or streets of a higher order;

2. The actual or potential development of adjacent sites (whether there is likely to be traffic passing through from neighboring developments). A "potential" development means a development having approvals granted, applications pending, or undergoing preliminary review; and

3. The streets proposed for that area, if any, as contained in the municipal master plan.

5:21-4.2 Cartway Width

(a) Cartway width for each street classification shall be determined by parking and curbing requirements that are based on the intensity of development served by that street.

(b) Intensity of development shall be based on the number of dwelling units per gross acre of land served by a particular street, excluding the acreage of dedicated common open space or other areas restricted from future development, as follows:

INTENSITY	DWELLING UNITS PER GROSS ACRE
Low	Less than or equal to 4
Medium	More than 4 and less than or equal to 8
High	More than 8

(c) Cartway widths for each street classification are as shown in Table 4.3.

(d) Cartway width also shall consider possible limitations imposed by sight distances, climate, terrain, and maintenance needs.

(e) Municipalities may require additional cartway width for major or minor collectors which are part of a designated bike route, as indicated in the bicycle circulation part of the municipal master plan, to make them consistent with the AASHTO guidelines for bicycle-compatible streets.

5:21-4.3 Curbs or Curbs and Gutters

(a) Curbs or curbs and gutters shall be used for drainage purposes, safety, and delineation and protection of pavement edge. Where, based on stormwater management system design, there is determined to be a problem with runoff, curbs or curbs and gutters shall be used.

(b) Curb requirements shall vary according to street hierarchy and intensity of development, in accordance with the requirements set forth in Table 4.3 in N.J.A.C. 5:21-4. Generally, curbs shall be required on streets with on-street parking.

(c) Where curbing is not required, edge definition and stabilization shall be furnished for safety reasons, and to prevent pavement unraveling. Curbing may be required for: stormwater management, road stabilization, delineation of parking areas, ten (10) feet on each side of drainage inlets, intersections, corners, and tight radii.

(d) Curb requirements may be waived by the appropriate municipal approving agency, and shoulders and/or drainage swales used when it can be shown that: shoulders are required by CAFRA; soil and/or topography make the use of shoulders and/or drainage swales preferable; and/or the community desires to preserve its rural character by using shoulders and/or drainage swales instead of curbs. In cases of medium development intensity, the curbing requirement may be waived where front setbacks exceed 40 feet and it can be demonstrated that sufficient on-site parking exists.

(e) A municipality may designate a curb type by ordinance. Where curb type is not established by municipal ordinance, flexibility regarding curb type shall be permitted as long as the curb type accommodates the system of drainage proposed. Generally, curbs should be constructed of concrete or granite block. Curbing materials shall accommodate the purposes set forth in (c) above.

TABLE 4.1 AVERAGE DAILY MOTOR VEHICLE TRAFFIC TRIP GENERATION PER DWELLING UNIT[1]

LAND USE[2]	PEAK RATE
Single-family detached housing	10.1
Townhouse	5.9
Low-rise apartment	7.2
Mid-rise apartment	5.5
High-rise apartment	5.0
Mobile home park	5.0
Retirement community	2.8
Recreational homes (owner occupied)	3.2

NOTES: [1]The trip generation rates listed are guidelines only. The actual use of trip generation rates is derived by the use of regression analysis and should be computed only by professionals proficient in the use of the ITE *Trip Generation* manual. The "Land Use" definitions are based on the ITE manual, with slight modifications to address inconsistencies contained within the ITE manual.

[2]For two-family dwellings (duplexes), apply the values for single-family dwellings to each unit.

SOURCE: Institute of Transportation Engineers, *Trip Generation* (Washington, D.C.: ITE, 1982), 3rd Edition. The table was updated with data from the 6th Edition of the manual published by ITE in 1997. The peak ADT rates take into consideration Saturday and Sunday rates, as well as weekday rates.

TABLE 4.1 continued. DEFINITIONS	
LAND USE	**DEFINITION**
Single-family detached housing	Any single-family detached home on an individual lot.
Townhouse	Attached multiple-family dwelling units where the only separation between units is vertical.
Apartment	A dwelling unit located within the same building with at least three other dwelling units.
Low-rise apartment	An apartment in a building that has one or two levels (floors).
Mid-rise apartment	An apartment in a building that has more than two levels (floors) and less than ten levels.
High-rise apartment	An apartment in a building with ten or more levels (floors).
Mobile home park	Generally, trailers shipped, sited, and installed on permanent foundations and in areas that typically have community facilities, such as recreation rooms, swimming pools, and laundry facilities.
Retirement community	Residential units similar to apartments and condominiums usually restricted to adults or senior citizens, and located in self-contained villages. Special services such as medical, dining, and retail facilities may be available.
Recreational home	Dwellings usually located in a resort containing local services and complete recreational facilities. These are often second homes used by the owner or rented on a seasonal basis.

TABLE 4.2 RESIDENTIAL STREET HIERARCHY DEFINITIONS		
STREET TYPE	**DESCRIPTION**	**AVERAGE DAILY TRAFFIC (maximum)**
RESIDENTIAL ACCESS**	Lowest order, other than rural street type, of residential streets. Provides frontage for access to lots and carries traffic with destination or origin on the street itself. Designed to carry the least amount of traffic at the lowest speed. All, or the maximum number of housing units, shall front on this class of street. *Residential access streets of "loop" configuration, that is two ways out, should be designed so no section conveys an ADT greater than 1,500. Each half of a loop street may be classified as a single residential access street, but the total traffic volume generated on the loop street should not exceed 1,500 ADT, nor should it exceed 750 ADT at any point of traffic concentration.	1,500*
RESIDENTIAL NEIGHBORHOOD**	A type of residential access street conforming to traditional subdivision street design, and providing access to building lots fronting on a street, and parking on both sides of street. **Applicant may choose either the RESIDENTIAL ACCESS or the RESIDENTIAL NEIGHBORHOOD street type for new streets. See section 4.8(b) for specific right-of-way and cartway width requirements for new streets that are a continuation of an existing street.	
MINOR COLLECTOR	Middle order of residential street. Provides frontage for access to lots and carries traffic of adjoining residential access streets. Designed to carry somewhat higher traffic volumes than lower-order streets such as rural and residential access streets, with traffic limited to motorists having origin or destination within the immediate neighborhood. Is not intended to carry regional traffic. Each half of a loop-configured minor collector may be classified as a single minor collector street, but the total traffic volume conveyed on the loop should not exceed 3,500 ADT, nor should it exceed 1,750 ADT at any point of traffic concentration.	3,500
MAJOR COLLECTOR	Highest order of residential streets. Conducts and distributes traffic between lower-order residential streets and higher-order streets -- arterials and expressways. Carries the largest volume of traffic at higher speeds. Function is to promote free traffic flow; therefore, parking should be prohibited and direct access to homes from this level of street should be avoided. Collectors should be designed so they cannot be used as shortcuts by non-neighborhood traffic.	7,500

TABLE 4.2 continued. RESIDENTIAL STREET HIERARCHY DEFINITIONS

STREET TYPE	DESCRIPTION	AVERAGE DAILY TRAFFIC (maximum)
SPECIAL-PURPOSE STREETS		
Rural street	A rural street is a street that serves dwellings on lots that are one acre or greater, AND primarily serves as access to abutting building lots, AND has no on-street parking, AND has lot-to-street access designed so vehicles do not back out of lots onto the street. Rural streets shall only connect to rural streets, rural lanes, or mixed-use collectors. However, a rural street shall not connect two mixed-use collectors.	500
Rural lane	A rural lane is a street that serves dwellings on lots that are two acres or greater, AND primarily serves as access to abutting building lots, AND has no on-street parking, AND has lot-to-street access designed so vehicles do not have to back out of lots onto the street. Rural lanes shall only connect to rural streets, rural lanes, or mixed-use collectors. However, a rural lane shall not connect two mixed-use collectors.	200
Alley	A service road that provides a secondary means of access to lots. On the same level as residential access street, but different standards apply. No parking shall be permitted; alleys should be designed to discourage through traffic.	500
Cul-de-sac[1]	A street with a single means of ingress and egress and having a turnaround, the design of which may vary. A divided-type entrance roadway to at least the first cross street, with median of sufficient width to ensure freedom of continued emergency access by lanes on one side, shall not be considered part of a cul-de-sac. Parking lots with a single means of ingress and egress shall not be included within the definition of cul-de-sac.	250
Marginal access street	A service street that runs parallel to a higher-order street and provides access to abutting properties and separation from through traffic. May be designed as residential access street or minor collector, according to anticipated daily traffic.	1,500 (residential access total) 3,500 (minor collector total)

TABLE 4.2 continued. RESIDENTIAL STREET HIERARCHY DEFINITIONS

STREET TYPE	DESCRIPTION	AVERAGE DAILY TRAFFIC (maximum)
SPECIAL-PURPOSE STREETS		
Divided street	Municipalities may require streets to be divided to provide alternate emergency access, protect the environment, or avoid grade changes. Design standards should be applied to the combined dimensions of the two street segments, as required by the street class.	
Multifamily access cul-de-sac	A street with a single means of ingress and egress, which serves multifamily development, that provides a means for vehicles to turn around.	1,000
Multifamily court	A street with a single means of ingress and egress, which serves multifamily development, that does not provide a means for vehicles to turn around. The length of multifamily courts is limited to 300 feet.	Note[2]

Notes:

[1]Streets serving multifamily developments with a single means of ingress and egress shall be classified as multifamily access cul-de-sacs.

[2]There is no ADT limit for multifamily courts specified because the length of the court will effectively limit the ADT to acceptable levels.

(f) Curbs shall be constructed according to the specifications set forth in N.J.A.C. 5:21-4.17.

(g) Curbing shall be designed to provide a curb ramp in compliance with the Americans with Disabilities Act or the Barrier Free Subcode of the New Jersey Uniform Construction Code (N.J.A.C. 5:23-7) at street intersections, as applicable.

(h) Where curbs and gutters are used and where the street is part of a designated bike route as indicated in the bicycle circulation part of the municipal master plan, the municipality may require that the cartway width be increased by one foot on each side of a street that uses a curb and gutter.

5:21-4.4 Shoulders

(a) Shoulders should be used instead of curbs when:

1. Shoulders are required by CAFRA;

2. Soil and/or topography make the use of shoulders preferable; and/or

3. To preserve rural character.

(b) Shoulders shall be provided in accordance with the requirements in Table 4.3 in N.J.A.C. 5:21-4.

(c) Shoulders shall be four feet wide, except for minor collector streets of high intensity with off-street parking, which shall be six feet wide on each side for all streets, and major collector streets of medium and high intensity, which shall be eight feet wide on each side for all streets. Shoulders shall be located within the right-of-way as shown in the following street illustrations.

(d) Shoulders shall be constructed of materials such as stabilized earth, gravel, crushed stone, bituminous treatment, or other forms of pavement which provide for vehicle load support. Shoulders along major collectors and shoulders along streets that are part of a designated bike path as indicated in the bicycle circulation portion of the municipal master plan shall be paved with asphalt pavement.

5:21-4.5 Sidewalks and Graded Areas

(a) Sidewalks and/or graded areas shall be required, depending on road classification and intensity of development, in accordance with the requirements set forth in Table 4.3 in N.J.A.C. 5:21-4.

(b) Sidewalks shall be provided where graded areas are specified in Table 4.3 when the conditions described in 1 or 2 below exist:

1. The minimum lot size in the development is smaller than one acre and

   i. the development or project is located within 2,500 feet of a train station, or public or school bus route; or

   ii. the development or project is located within 2,500 feet of an existing recreational, business, or retail use or a site where such use is permitted by existing zoning; or

   iii. where the proposed streets connect to or extend existing streets which have sidewalks on both sides.

2. The minimum lot size in the development is smaller than two acres and the development is located within two miles of a school.

(c) Notwithstanding 1 and 2 above, sidewalks shall only be required on one side of rural streets or rural lanes and shall not be required in alleys.

(d) Sidewalks shall be placed parallel to the street, as shown in the street profile figures, unless an exception has been permitted to preserve topographical or natural features, or if required to provide visual interest, or unless the applicant shows that an alternative pedestrian system provides safe and convenient circulation (e.g., in planned development).

(e) Sidewalks along streets with nonparallel parking shall be placed parallel to the street, and shall be placed so that sidewalks do not lead pedestrians between parked vehicles and the traveled way. This subsection shall not apply to driveways.

(f) Pedestrian-way easements at least 10 feet wide may be required by the municipal approving authority through the center of blocks more than 600 feet long. In providing circulation or access to schools, playgrounds, shopping, adjoining residential areas, or other community facilities, the municipality shall consider and may require pedestrian-way easements.

TABLE 4.3 CARTWAY AND RIGHT-OF-WAY WIDTHS

STREET TYPE[a]	TOTAL AVG. DAILY TRAFFIC	TRAV-ELED WAY	NO. OF PARKING LANES[b]	PARKING LANE WIDTH	CART-WAY WIDTH	CURB OR SHOUL-DER[h]	SIDE-WALK OR GRADED AREA[j]	RIGHT-OF-WAY WIDTH[i]
RESIDENTIAL ACCESS	1,500*							
a. Parallel Parking								
Low intensity	*(loop-750 each half)	21’	1	7’	28’	None	1 SW 1 GA	50’
Medium intensity		21’	1	7’	28’	Curb	2 SW	50’
High intensity (on-street parking)		21’	1	7’	28’	Curb	2 SW	50’
b. Nonparallel Parking (all intensities)								
One-side parking		24’	1	18’		Curb	2 SW[n]	54’
Two-side parking		24’	2	36’		Curb	2 SW[n]	72’
c. No Parking High intensity (off-street parking)		20’	0	0’	20’	None	2 SW	50’
NEIGHBORHOOD (all intensities)	1,500	16’	2	14’	30’[c]	Curb	2 SW	50’
MINOR COLLECTOR[l]	3,500							
Low intensity[d] with no parking		20’	0	0’	20’	None	1 SW 1 GA	50’
Low intensity with one parking lane		21’	1	7’	28’	Curb	1 SW 1 GA	50’
Medium and high intensities with one parking lane		21’	1	7’	28’	Curb	2 SW	50’
Medium and high intensities with two parking lanes		22’	2	14’	36’	Curb	2 SW	60’
Medium and high intensities with off-street parking		22’	0	0’	22’	Curb or shoulder	2 SW	50’
MAJOR COLLECTOR[l]	7,500							
Low intensity		24’	0	0’	24’	None	2 SW	50’
Medium and high intensities		24’	0	0’	24’	Curb or shoulder	2 SW	50’ if curb, 54’ if shoulder

TABLE 4.3 continued. CARTWAY AND RIGHT-OF-WAY WIDTHS

STREET TYPE[a]	TOTAL AVG. DAILY TRAFFIC	TRAV-ELED WAY	NO. OF PARKING LANES[b]	PARKING LANE WIDTH	CART-WAY WIDTH	CURB OR SHOUL-DER[h]	SIDE-WALK OR GRADED AREA[j]	RIGHT-OF-WAY WIDTH[i]
SPECIAL-PURPOSE STREETS								
Rural street[k]	500	20’	0	0’	20’	None	2 GA	40’
Rural lane[k]	200	18’	0	0’	[18’]	None	2 GA	40’
Alley (one way)					9’			11’
Alley (two way)		18’	0	0’	[18’]	None	2 GA	22’
Cul-de-sac (stem)[e]	250							
Marginal access street[f]								
Divided street[g]								
Multifamily access cul-de-sac[m]	1,000							
Multifamily court	Note[p]							

NOTES:

[a]See Table 4.2 for definitions of street hierarchy and N.J.A.C. 5:21-4.2 for definitions of low, medium, and high intensity of development.

[b]Parking lane refers to parallel parking, except in the case of residential access streets with nonparallel parking, which have perpendicular parking.

[c]The 30’ cartway would accommodate two 7’ parking lanes and a 16’ traveled way.

[d]20’ minor collector cartways are permitted only when there is no direct driveway access to or from the street in question.

[e]Cartway widths of cul-de-sac stems should conform to the applicable street type. Right-of-ways for cul-de-sac stems shall extend a minimum of 8’ beyond the cartway. Cul-de-sacs shall provide for a cartway turning radius of 40’ and a right-of-way line 8’ beyond the edge of the cartway.

[f]Cartway and right-of-way widths of marginal access streets and right-of-way requirements should conform to standards of either residential access or minor collector streets, as dictated by average daily traffic. If the classification is a minor collector requiring a 36’ cartway, cartway width may be reduced to 28’, since frontage is restricted to one side of the street.

[g]Cartway widths of divided streets should conform to standards of street classification, as dictated by anticipated average daily traffic, and be applied as aggregate dimensions of two street segments. Divided streets shall be provided with cut-throughs at a maximum of 1,200’ intervals.

[h]See N.J.A.C. 5:21-4.3(c) for additional requirements.

[i]Right-of-way width applies only to streets proposed for dedication as shown on approved plans.

[j]See N.J.A.C. 5:21-4.5(b) for additional requirements.

[k]Rural streets and rural lanes are permitted only within developments which do not exceed an average daily traffic count of 500 and 200, respectively.

TABLE 4.3 continued. CARTWAY AND RIGHT-OF-WAY WIDTHS

NOTES continued:

[l]Municipalities may require additional cartway width for major or minor collectors which are part of a designated bicycle route as indicated in the circulation part of the municipal master plan to make them consistent with the AASHTO guidelines for bicycle-compatible streets.

[m]Cartway widths of multifamily cul-de-sac stems should conform to the applicable residential access street type. Cul-de-sacs shall provide for a cartway turning radius of 40 feet or other suitable means for vehicles to turn around, such as hammerheads. Where not located on private property, a right-of-way line eight feet beyond the edge of the cartway shall be provided.

[n]Sidewalks provided for streets with nonparallel parking shall be placed in accordance with N.J.A.C. 5:21-4.5(e).

[o]Cartway and right-of-way widths for multifamily courts shall comply with the design criteria for residential access streets, based on the parking configuration. Multifamily courts need not be provided with a means for turning around; however, their length shall not exceed 300 feet.

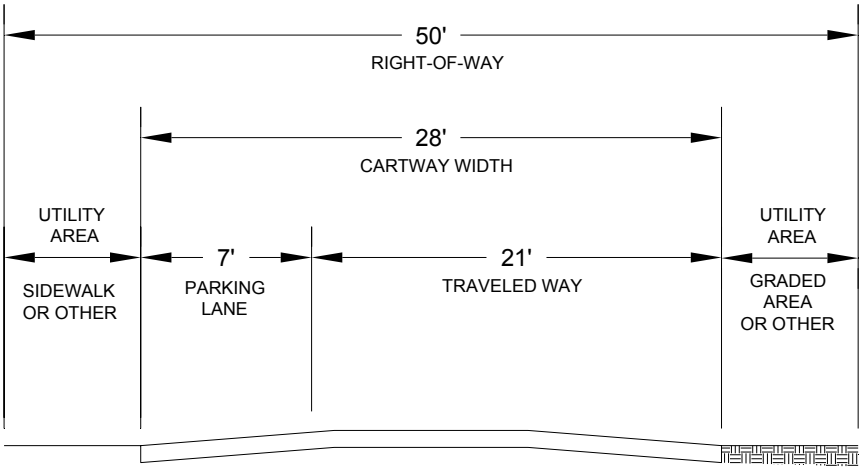
[p]There is no ADT limit for multifamily courts; however, the length of a multifamily court is limited to 300 feet.

ILLUSTRATIONS OF STREET LAYOUTS FOLLOW:

Note: The individual components shown in the non-travel-way portion of the right-of-way such as utility areas, sidewalks, and graded areas are indicated for illustrative purposes only. Municipalities may vary the placement and dimensions of these individual items, depending on utility company requirements and local practice and preferences. In addition, items such as shade trees may be accommodated within the total right-of-way widths indicated for each street type. Several street types are not illustrated because of the limited or various, as the case may be, design possibilities.

RESIDENTIAL ACCESS
(low intensity)

Illustration 1 of 14

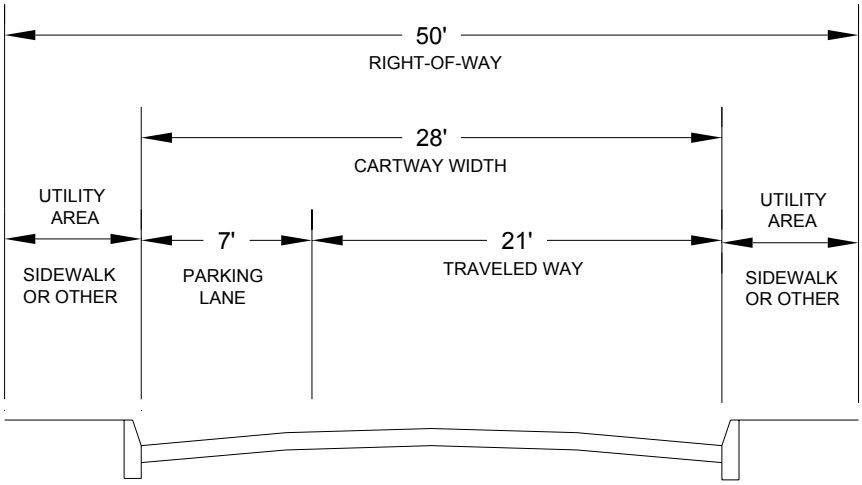


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	21 FEET
NUMBER OF PARKING LANES:	1
PARKING LANE WIDTH:	7 FEET
CARTWAY WIDTH:	28 FEET
CURB OR SHOULDER:	NONE
SIDEWALK OR GRADED AREA:	1 SW 1 GA
RIGHT-OF-WAY:	50 FEET

RESIDENTIAL ACCESS
(high intensity with on-street parking
and medium intensity)

Illustration 2 of 14

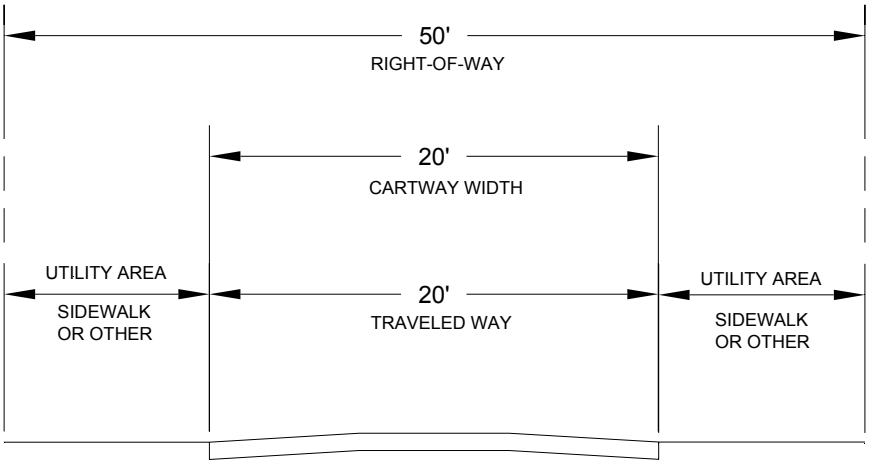


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	21 FEET
NUMBER OF PARKING LANES:	1
PARKING LANE WIDTH:	7 FEET
CARTWAY WIDTH:	28 FEET
CURB OR SHOULDER:	CURB
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

RESIDENTIAL ACCESS
(high intensity with off-street parking)

Illustration 3 of 14

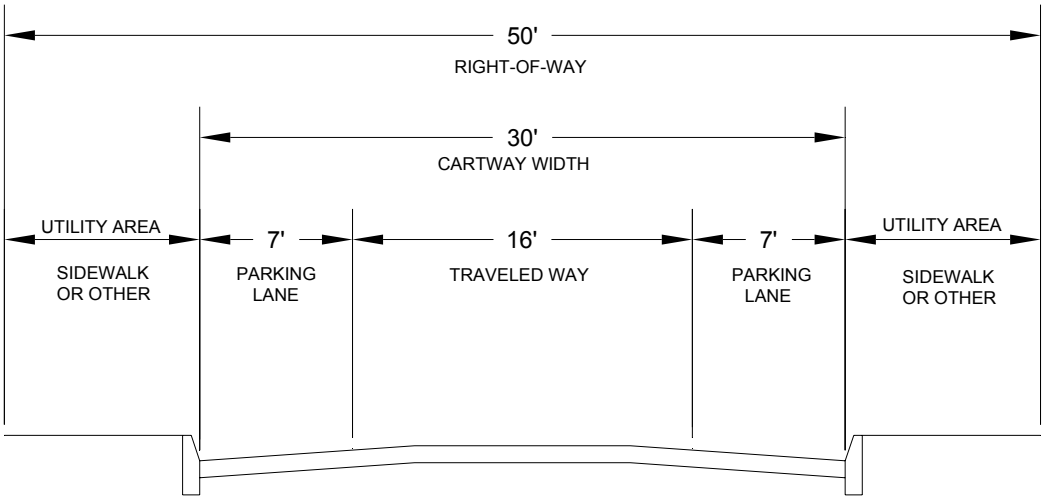


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	20 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	20 FEET
CURB OR SHOULDER:	NONE
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

NEIGHBORHOOD
(all intensities)

Illustration 4 of 14

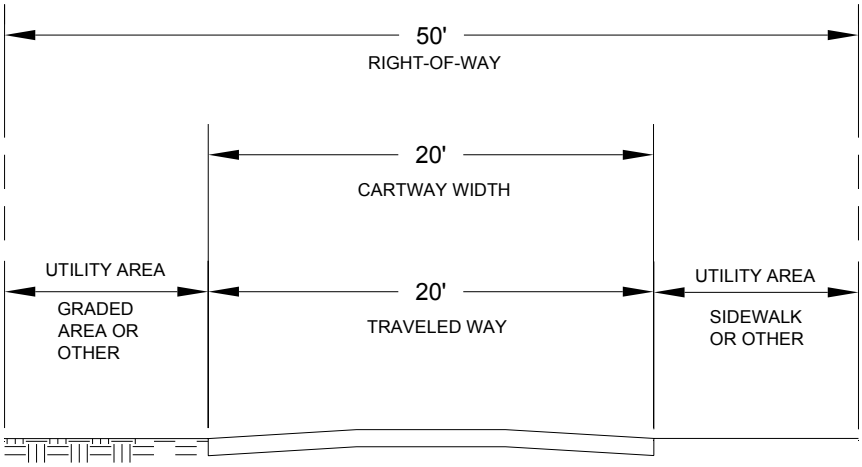


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	16 FEET
NUMBER OF PARKING LANES:	2
PARKING LANE WIDTH:	14 FEET
CARTWAY WIDTH:	30 FEET
CURB OR SHOULDER:	CURB
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

MINOR COLLECTOR
(low intensity with no parking)

Illustration 5 of 14

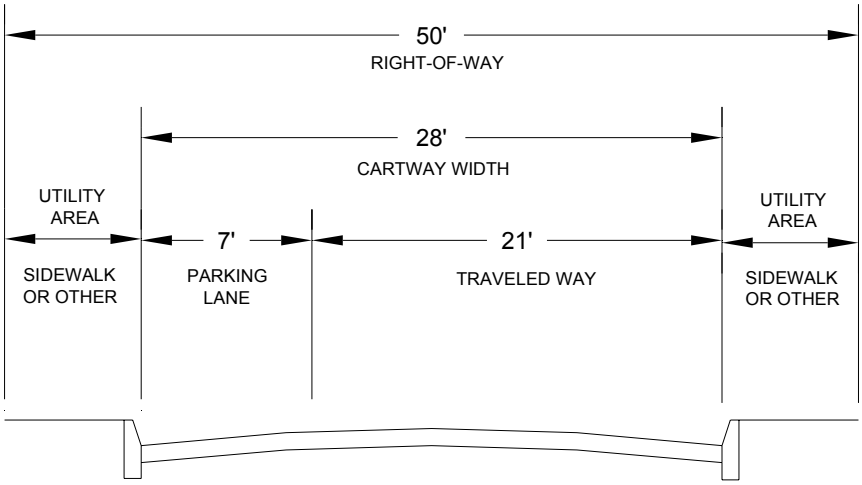


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	20 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	20 FEET
CURB OR SHOULDER:	NONE
SIDEWALK OR GRADED AREA:	1 SW 1 GA
RIGHT-OF-WAY:	50 FEET

MINOR COLLECTOR
(low, medium, and high intensities
with one parking lane)

Illustration 6 of 14

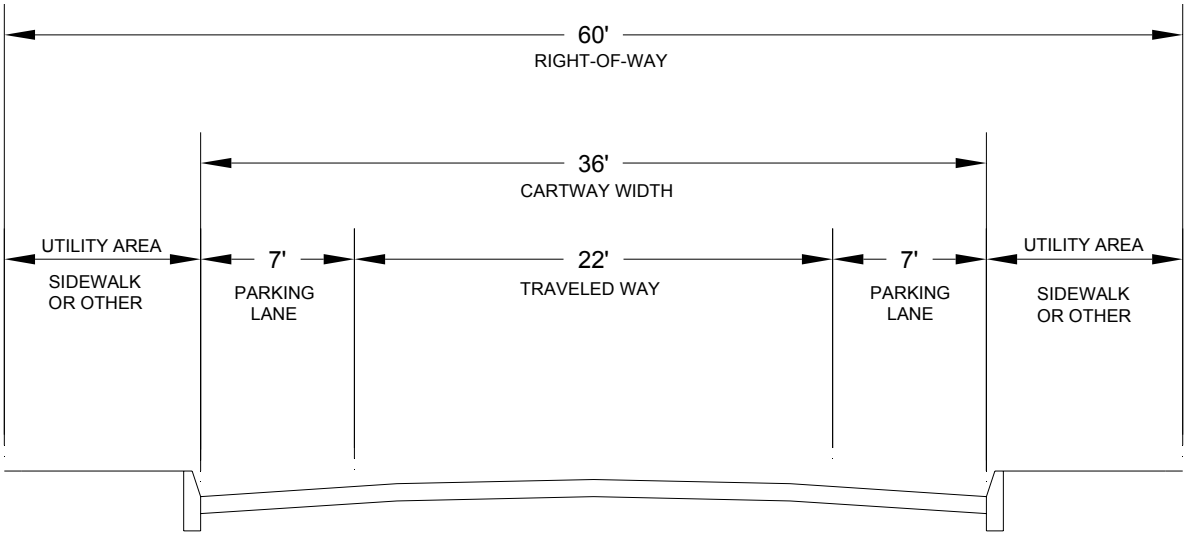


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	21 FEET
NUMBER OF PARKING LANES:	1
PARKING LANE WIDTH:	7 FEET
CARTWAY WIDTH:	28 FEET
CURB OR SHOULDER:	CURB
SIDEWALK OR GRADED AREA:	
low, one parking lane:	1SW, 1GA
medium, one parking lane:	2 SW
high, one parking lane:	2 SW
RIGHT-OF-WAY:	50 FEET

MINOR COLLECTOR
(medium and high intensities
with two parking lanes)

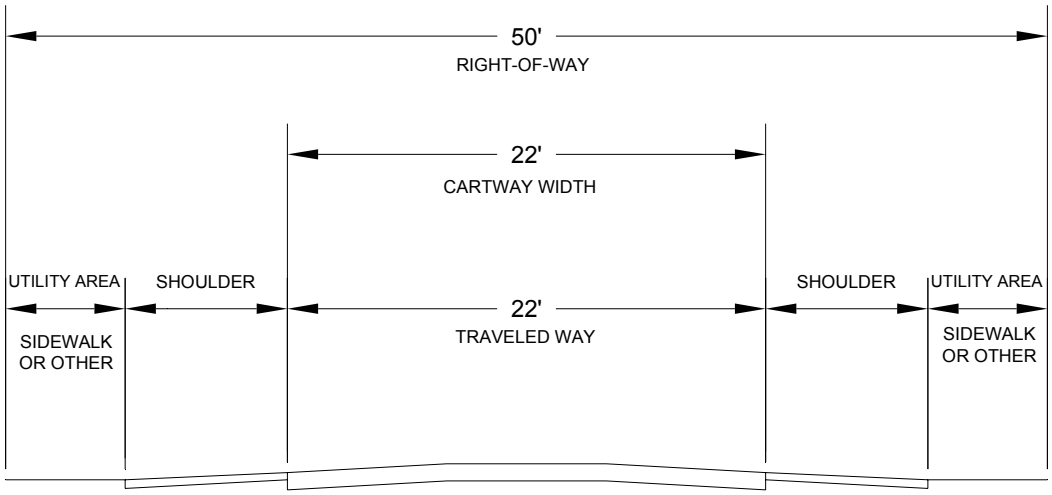
Illustration 7 of 14



FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	22 FEET
NUMBER OF PARKING LANES:	2
PARKING LANE WIDTH:	14 FEET
CARTWAY WIDTH:	36 FEET
CURB OR SHOULDER:	CURB
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	60 FEET

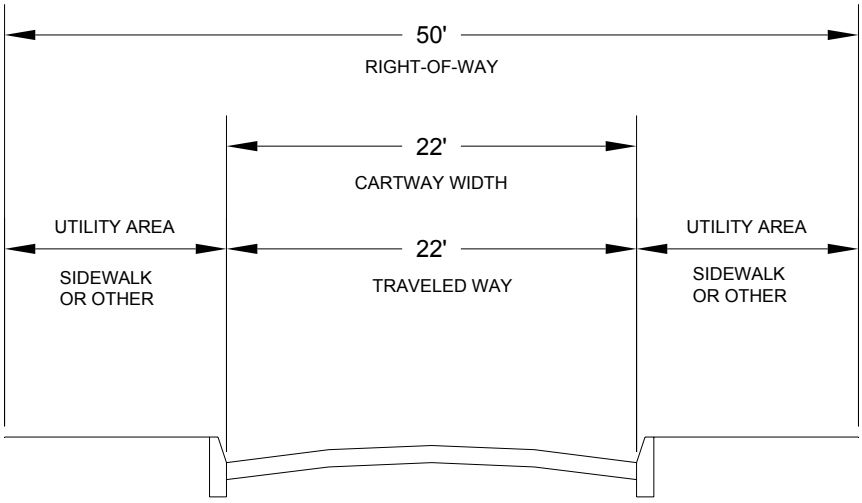
MINOR COLLECTOR
(medium and high intensities
with off-street parking
and shoulders)



FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	22 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	22 FEET
CURB OR SHOULDER:	SHOULDER
medium intensity:	4 FEET
high intensity:	6 FEET
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

MINOR COLLECTOR
(medium and high intensities
with off-street parking and curb)

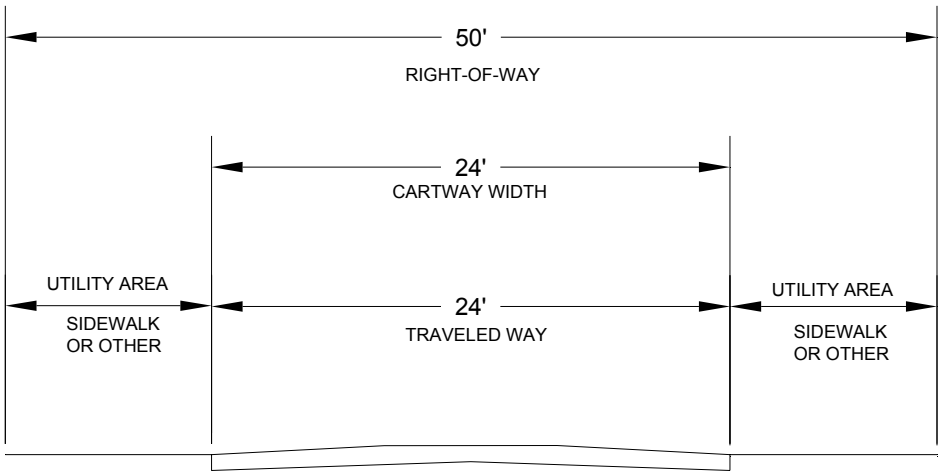


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	22 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	22 FEET
CURB OR SHOULDER:	CURB
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

MAJOR COLLECTOR
(low intensity)

Illustration 10 of 14

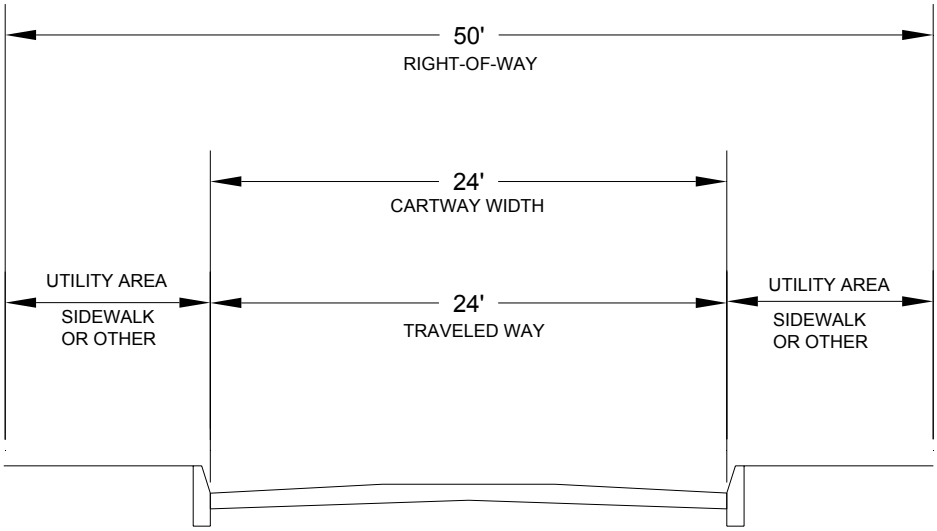


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	24 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	24 FEET
CURB OR SHOULDER:	NONE
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

MAJOR COLLECTOR
(medium and high intensities with curb)

Illustration 11 of 14

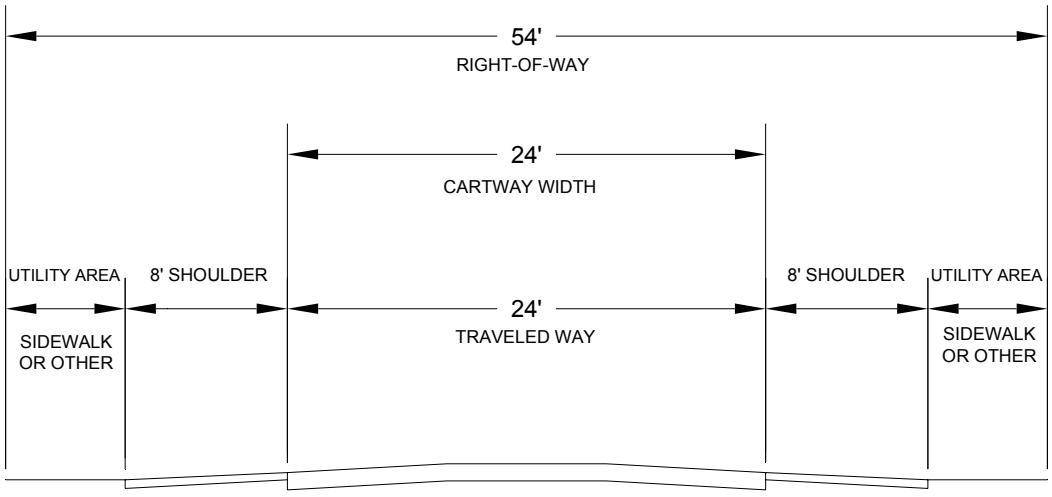


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	24 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	24 FEET
CURB OR SHOULDER:	CURB
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

MAJOR COLLECTOR
(medium and high intensities
with shoulders)

Illustration 12 of 14

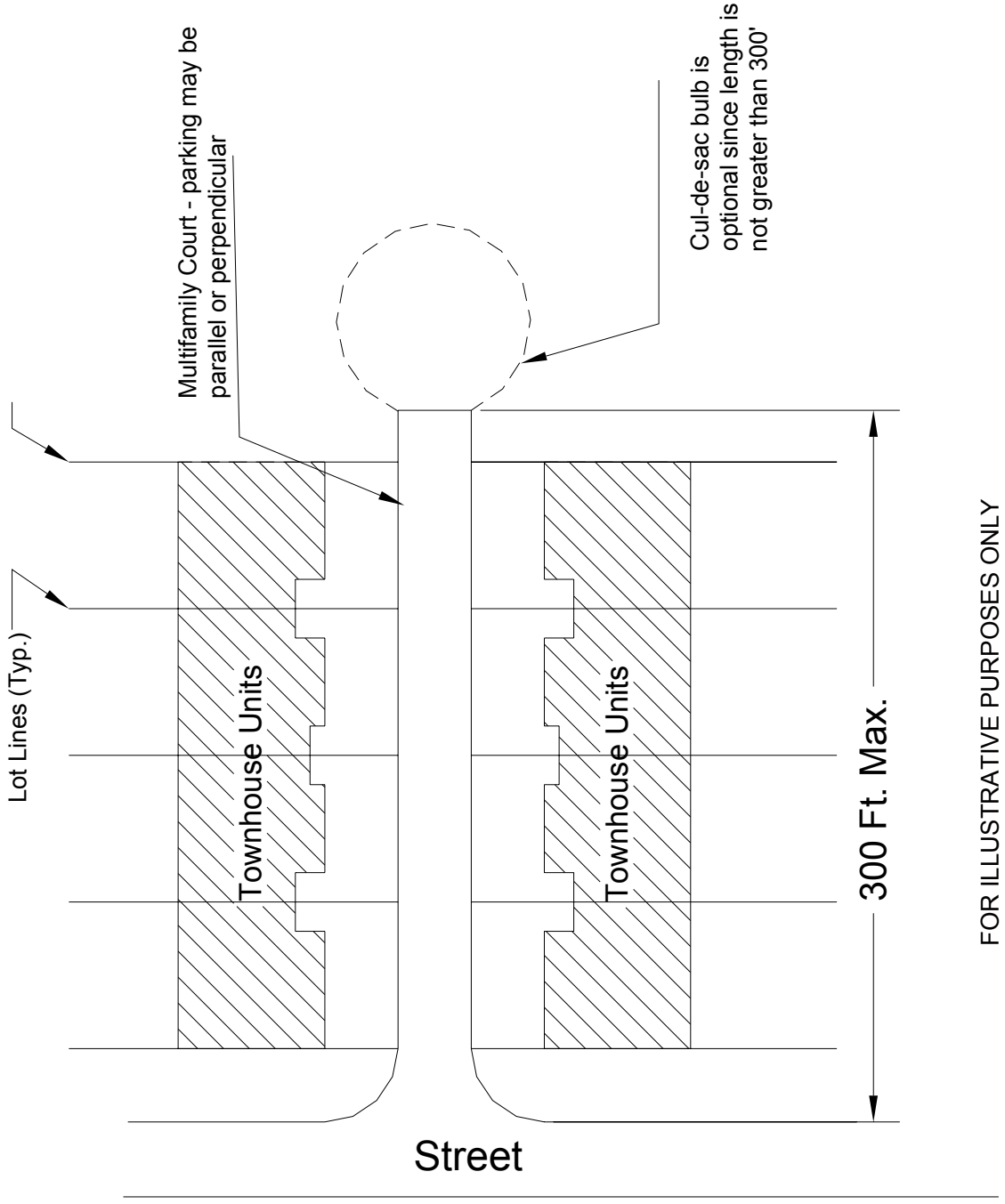


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	24 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	24 FEET
CURB OR SHOULDER:	SHOULDER
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	54 FEET

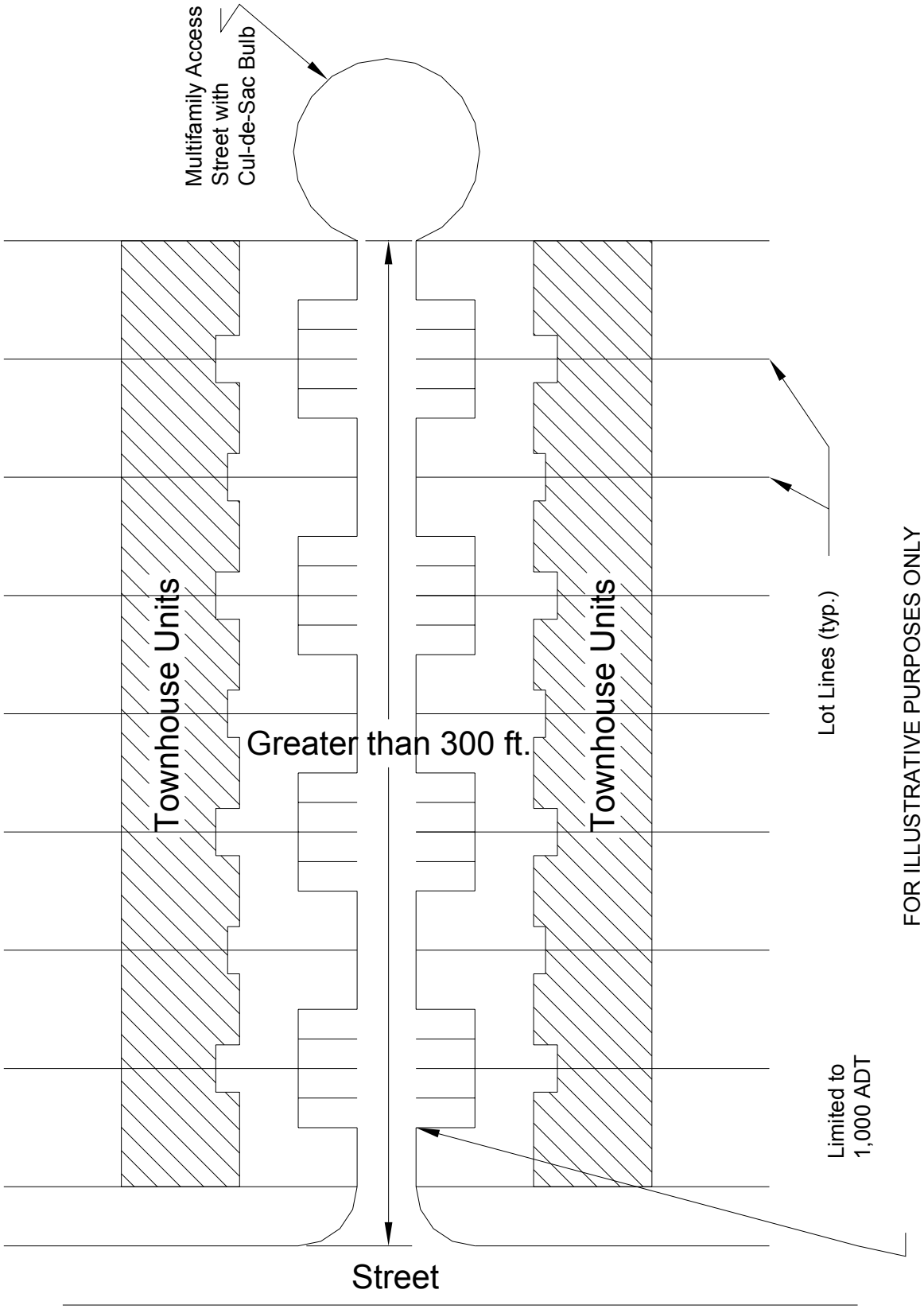
MULTIFAMILY COURT

Illustration 13 of 14



MULTIFAMILY ACCESS
CUL-DE-SAC

Illustration 14 of 14



(g) Sidewalk width shall be four feet; wider widths may be necessary near pedestrian generators and employment centers. Where sidewalks abut the curb and cars overhang the sidewalk, widths shall be six feet. In high-density residential areas where sidewalks abut the curb, a sidewalk/graded area of at least six feet in width shall be required.

(h) Sidewalks and graded areas shall be constructed according to the specifications set forth in N.J.A.C. 5:21-4.18.

5:21-4.6 Bikeways

(a) Separate bicycle paths and lanes shall be required only if such paths and lanes have been specified as part of a municipality's adopted master plan and/or official map.

(b) Bicycle lanes, where provided, shall be placed in the outside lane of a roadway, adjacent to the curb or shoulder. When on-street parking is permitted, the bicycle lane shall be between the parking lane and the outer lane of moving vehicles. Lanes shall be delineated with markings, preferably striping. Raised reflectors or curbs shall not be used.

(c) The construction of bikeways shall comply with the specifications set forth in N.J.A.C. 5:21-4.18.

5:21-4.7 Utility Areas

(a) Utility mains shall be located within the right-of-way or within utility easements outside the right-of-way.

(b) Utility areas shall be planted with grass, ground cover, or treated with other suitable cover material.

5:21-4.8 Right-of-Way and Cartway

(a) The right-of-way shall be measured from lot line to lot line. Right-of-way requirements are shown in Table 4.3 in N.J.A.C. 5:21-4 and displayed graphically in the street illustrations in N.J.A.C. 5:21-4.

(b) The municipal approving authority may require the right-of-way and cartway widths of a new street that is a continuation of an existing street to be at least the same widths as the existing street.

(c) The right-of-way shall be of sufficient width to accommodate future development, as indicated by the municipal master plan.

(d) Where turning lanes are needed based on safety or capacity, additional right-of-way width, not to exceed the width and length of the turning lanes, may be required.

5:21-4.9 Street Grade and Intersections

Street grade and intersection design shall be constructed according to the specifications set forth in N.J.A.C. 5:21-4.19.

5:21-4.10 Pavement

(a) Street pavement thickness shall vary by street hierarchy, subgrade properties, and pavement type.

(b) Pavement design for rural, residential access, neighborhood, minor collector, and major collector streets shall conform to the specifications in N.J.A.C. 5:21-4.19.

5:21-4.11 Street and Site Lighting – RESERVED

5:21-4.12 Underground Wiring

(a) All electric, telephone, television, and other communication facilities, both main and service lines servicing new developments, shall be provided by underground wiring within easements or dedicated public rights-of-way, installed in accordance with the prevailing standards and practices of the utility or other companies providing such services.

(b) Lots that abut existing easements or public rights-of-way, where overhead electric or telephone distribution supply lines and service connections have heretofore been installed, may be supplied with electric and telephone service from those overhead lines, but the service connections from the utilities' overhead lines shall be installed underground.

(c) Overhead lines may be permitted as an exception by the municipal approving authority in areas of severe geological conditions. The placement and alignment of the poles shall be designed to lessen the visual impact of overhead lines.

5:21-4.13 Street and Traffic Signs

(a) Design and placement of traffic signs included in the Manual on Uniform Traffic Control Devices for Streets and Highways shall follow the requirements specified in the Manual on Uniform Traffic Control Devices for Streets and Highways, published by the U.S. Department of Transportation and adopted by the N.J. Department of Transportation.

(b) At least two street name signs shall be placed at each four-way street intersection and one at each "T" intersection. Signs shall be placed so as not to obstruct sight distances and under light standards, if present, so that they are clearly visible. The design of street name signs should be: consistent, of a style appropriate to the community, of a uniform size and color, and erected in accordance with local standards.

(c) At signalized intersections, street signs shall be located on the overhead arm supporting the traffic signal, or otherwise suitably suspended over the intersection. Roadway clearance shall be a minimum of 15 feet from the bottom of any sign or supporting equipment and the top of the paved surface.

5:21-4.14 Parking: Number of Spaces

(a) An adequate number of on-street and off-street parking spaces shall be required in all developments to accommodate residents and visitors. For projects containing dwelling

units required by the New Jersey Uniform Construction Code's Barrier Free Subcode (N.J.A.C. 5:23-7) to be accessible, accessible parking spaces for people with disabilities shall be provided in accordance with the requirements of the Barrier Free Subcode and shall be considered part of the total number of required spaces.

(b) For residential developments, parking shall be provided, as set forth in Table 4.4. If applicant does not specify the number of bedrooms per unit, note "c" for each category in Table 4.4 shall apply for the parking requirement.

(c) Alternative parking standards to those shown in Table 4.4 shall be accepted if the applicant demonstrates these standards better reflect local conditions. Factors affecting minimum number of parking spaces include household characteristics, availability of mass transit, urban versus suburban location, and available off-site parking resources.

(d) Garage and driveway combinations shall be counted as follows:

1. Each garage car space shall be counted as 1.0 off-street parking space, regardless of the dimensions of the driveway.

2. A one-car garage and driveway combination shall count as 2.0 off-street parking spaces, provided the driveway measures a minimum of 18 feet in length between the face of the garage door and the right-of-way.

3. A two-car garage and driveway combination shall count as 3.5 off-street parking spaces, provided a minimum parking area width of 20 feet is provided for a minimum length of 18 feet as specified for a one-car garage and driveway combination.

(e) When housing is included in mixed-use development, a shared parking approach to the provision of parking shall be permitted.

(f) When, in the judgment of the local approving authority, on-street parking is available, then only that proportion of the parking requirement which is not available on the street shall be provided in off-street parking facilities. A length of 23 feet per on-street parking space shall be used in calculating the number of available on-street parking spaces.

5:21-4.15 Parking Space Size

Each off-street parking space shall measure nine (9) feet in width by eighteen (18) feet in length. Parking spaces for people with disabilities shall be in accordance with the New Jersey Uniform Construction Code (N.J.A.C. 5:23-7) or the Americans with Disabilities Act, as applicable.

5:21-4.16 Parking Lots

(a) Off-street parking lots shall be oriented to, and within a reasonable walking distance of, the buildings they are designed to serve.

(b) Access to parking lots shall be designed so as not to induce queues on travel ways, and to provide adequate pedestrian circulation and safety. There shall be adequate provision for ingress to and egress from all parking spaces to ensure ease of mobility, ample clearance, and safety of vehicles and pedestrians.

TABLE 4.4 PARKING REQUIREMENTS FOR RESIDENTIAL LAND USES[a]	
HOUSING UNIT TYPE/SIZE[b]	**PARKING REQUIREMENT**
SINGLE-FAMILY DETACHED	
2 Bedroom	1.5
3 Bedroom	2.0
4 Bedroom	2.5[c]
5 Bedroom	3.0
TWO FAMILY (duplex)	"Single-Family Detached" values shall apply to each unit.
GARDEN APARTMENT	
1 Bedroom	1.8
2 Bedroom	2.0[c]
3 Bedroom	2.1
TOWNHOUSE	
1 Bedroom	1.8
2 Bedroom	2.3[c]
3 Bedroom	2.4
HIGH RISE	
1 Bedroom	0.8
2 Bedroom	1.3[c]
3 Bedroom	1.9
MOBILE HOME	
1 Bedroom	1.8
2 Bedroom	2.0[c]
RETIREMENT COMMUNITY	Values shall be commensurate with the most appropriate housing unit type and size noted above that the retirement community resembles.
RECREATIONAL HOMES (owner occupied)	Values shall be commensurate with the most appropriate housing unit type and size noted above that the recreational homes (owner occupied) resemble.
MID-RISE APARTMENT	"Garden Apartment" values shall apply.
ASSISTED LIVING	0.5

NOTES:

[a]When determination of the required number of parking spaces results in a fractional space for the entire development, any fraction of one-half or less may be disregarded, while a fraction in excess of one-half shall be counted as one parking space.

[b]Requirements for attached units (apartment/condominium/townhouse) include provisions for guest parking (0.5 spaces per dwelling unit). Guest parking must either be provided for on street or in common parking areas.

[c]If applicant does not specify the number of bedrooms per unit, this parking requirement shall apply.

SOURCE: Modified and adapted from U.S. Department of Commerce, Bureau of the Census, Public Use File--New Jersey (cross-tabulation of vehicles by housing unit for units constructed 1975 to 1980).

(c) The width of all aisles providing direct access to individual parking stalls shall be in accordance with the requirements specified in Table 4.5. Only one-way traffic shall be permitted in aisles serving single-row parking spaces placed at an angle other than 90 degrees.

(d) Where sidewalks occur in parking lots, parked vehicles shall not overhang or extend over the sidewalk unless an additional two feet of sidewalk width are provided to accommodate such overhang.

(e) Where sole access to dwelling units is via a parking lot, the following features shall be provided:

1. Designated fire lanes a minimum of 18 feet in width shall be required as provided for in the Uniform Fire Code.

2. Parking lots shall be provided with turning bays or other means of turning at intervals of not greater than 1,200 feet. Turning bays, such as hammerheads or other configurations, shall measure at least 18 feet by 60 feet, or provide equivalent maneuvering space.

3. Parking lots having more than 100 spaces shall have a minimum of two means of ingress and egress, or be provided with a divided-type entrance.

TABLE 4.5 PARKING ANGLES AND AISLE WIDTHS

PARKING ANGLE (degrees)	AISLE WIDTH (feet)
30	12
45	13
60	18
90	24

5:21-4.17 Curb Construction Standards

(a) Construction specifications for acceptable curb types of granite block and concrete are shown in Figure 4.1.

(b) The standard concrete curb section used shall be a maximum of twenty (20) feet in length, with a scored joint every ten (10) feet. All concrete used for curbs or combination curbs and gutters shall be prepared in accordance with the requirements, by class of concrete, of the New Jersey Department of Transportation's Standard Specifications for Road and Bridge Construction effective at the time of preparation. Where bituminous concrete pavement is used for the road surface, the curb and/or gutter shall be constructed first.

(c) Where drainage inlets are constructed but curbs are not required, curbing must be provided at least ten (10) feet on each side of the inlet, set back one (1) foot from the extension of the pavement edge.

5:21-4.18 Sidewalk and Bikeway Construction Standards

(a) The following apply to sidewalks and graded areas:

1. Sidewalks of concrete shall be four (4) inches thick except at points of vehicular crossing, where they shall be at least six (6) inches thick. At vehicular crossings, concrete sidewalks shall be reinforced with welded wire fabric mesh or an equivalent.

2. Concrete, air-entrained sidewalks shall be Class B concrete, having a 28-day verification strength of 4,500 p.s.i. Other materials may be permitted, depending on the design of the development.

3. Graded areas shall be planted with grass or treated with other suitable ground cover, and their width and cross slope shall correspond to that of sidewalks.

(b) The following apply to bikeways:

1. The construction of bikeways shall conform to the New Jersey Department of Transportation's Planning and Design Guidelines for Bicycle-Compatible Roadways and Bikeways (November 1995) and the AASHTO Guide for the Development of Bicycle Facilities (1999), incorporated herein by reference.

2. Bicycle-safe drainage grates shall be used in the construction of all residential streets.

5:21-4.19 Street Grade, Intersections, Pavement, and Lighting Construction Standards

(a) The following apply to street grade:

1. Minimum street grade permitted for all streets shall be 0.5 percent.

2. Maximum street grade shall vary by road hierarchy with flatter grades required for roads with higher ADTs, in accordance with the requirements shown in Table 4.6. Where terrain makes it necessary, the allowable maximum grade may be increased by up to two percent, but shall not exceed a maximum grade of 16 percent.

(b) The following shall apply to intersections:

1. Street intersections shall be as nearly at right angles as possible and in no case shall be less than 75 degrees.

2. New intersections along one side of an existing street shall, if possible, coincide with any existing intersections on the opposite side of each street. Where provided, offsets for intersections along the same or opposite sides shall be at least 150 feet between right-of-way centerlines.

3. Intersections shall be rounded at the curbline with the street having the highest radius requirement, as shown in Table 4.6, determining the minimum standard for all curblines.

4. Intersections shall be designed with a flat grade wherever practical.

5. The minimum centerline radius, minimum tangent length between reverse curves, and curb radii shall be as shown in Table 4.6.

6. Sight triangles shall be in accordance with AASHTO's A Policy on Geometric Design of Highways and Streets, and based on the speed limits established by the government agency having jurisdiction. Sight triangle easements shall be required and shall include the area on each street corner that is bounded by the line which connects the sight or "connecting" points located on each of the right-of-way lines of the intersecting street. The planting of trees or other plantings, or the location of structures exceeding thirty (30) inches in height that would obstruct the clear sight across the area of the easements, shall be prohibited; and a public right-of-entry shall be reserved for the purpose of removing any object, material or otherwise, that obstructs the clear sight.

(c) Pavement shall be designed using either Figures 4.2 through 4.5, the structural number method, or the alternate pavement design methods referenced in 3 below.

1. Pavement design using figures: Pavement design for special-purpose streets (cul-de-sac, rural, etc.), residential access, neighborhood, minor collector, and major collector shall follow the specifications shown in Figures 4.2 through 4.5 based on the street type. Subgrade categories are shown in Table 4.7.

2. Structural number method: As an alternative to using Figures 4.2 through 4.5, applicants may design pavement using the structural numbers found in Table 4.9.

i. The designated structural number must be achieved by choosing the appropriate layers of bituminous stabilized surface course (Mix I-4, Mix I-5), bituminous stabilized base course (Mix I-2, stone mix), bituminous stabilized base course (Mix I-2, gravel mix), dense graded aggregate base course, soil aggregate base course, and subbase. The structural values and minimum layer thicknesses for the various materials are listed in Table 4.8.

ii. Thicknesses shall be provided in 0.5-inch increments.

3. Alternate pavement design: Alternative pavement design shall be allowed provided it conforms with one of the following: AASHTO Method of Flexible Pavement Design, Caltrans Method of Flexible Pavement Design, Asphalt Institute Method, AASHTO Method of Rigid Pavement Design, Fatigue Strength Method of Design, Multilayer Elastic Analysis, or the National Crushed Stone Association Design, incorporated herein by reference.

(d) Lighting - RESERVED

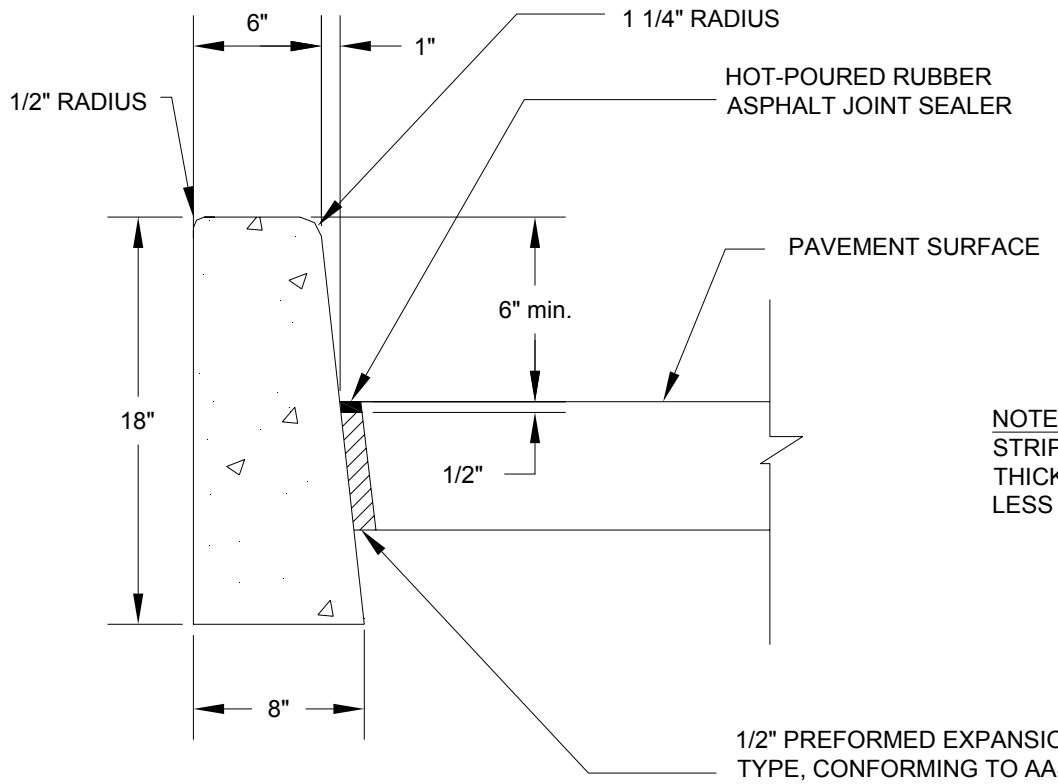
5:21-4.20 Curves

(a) Vertical curves shall be designed in accordance with AASHTO's A Policy on Geometric Design of Highways and Streets standards, incorporated herein by reference.

(b) Sight easements on vertical and horizontal curves shall be required and determined based on the sight distance requirements contained in AASHTO's A Policy on Geometric Design of Highways and Streets, taking into consideration the speed limits established by the government agency having jurisdiction. Residential access, residential

neighborhood, and rural street design shall be based on a speed limit of 25 miles per hour. Minor collector street design shall be based on a speed limit of 30 miles per hour. Major collector design shall be based on a speed limit of 30 miles per hour or five miles over the anticipated posted speed limit, whichever is higher.

Figure 4.1
(1 of 6)



N.T.S.

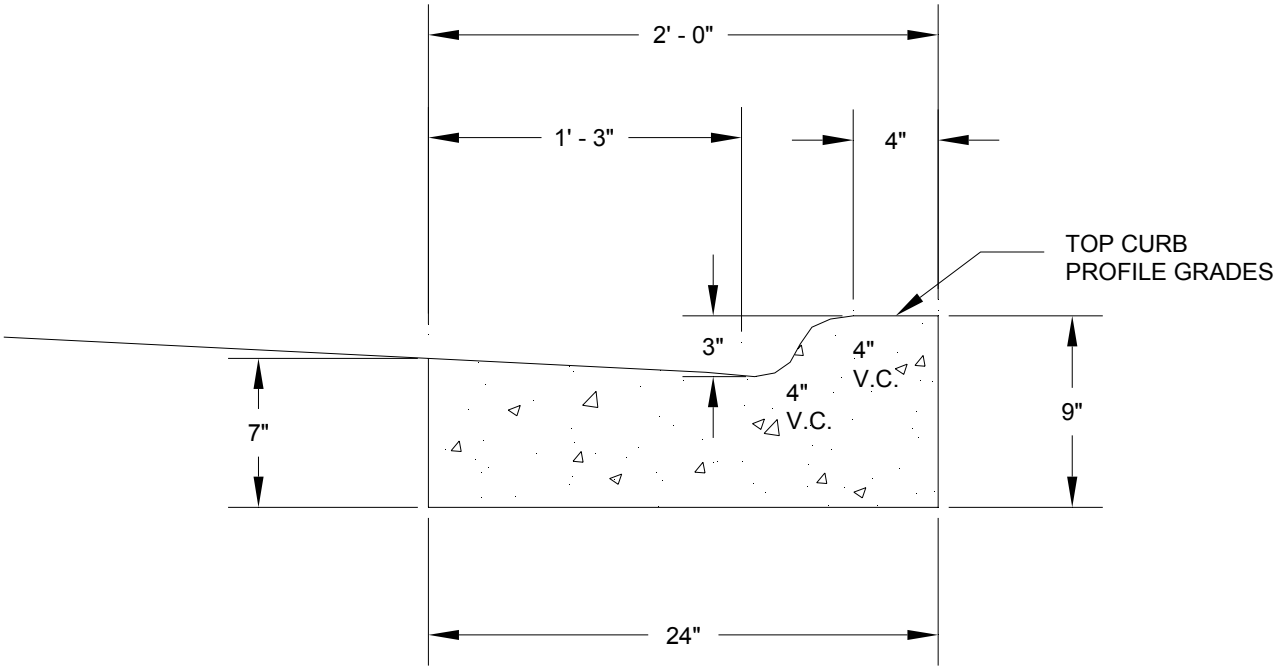
NOTES: 1. CONCRETE TO BE NJDOT CLASS "B" (AIR ENTRAINED).

2. TRANSVERSE JOINTS 1/2" WIDE SHALL BE INSTALLED IN THE CURB 20' - 0" APART AND SHALL BE FILLED WITH PREFORMED, BITUMINOUS-IMPREGNATED FIBER JOINT FILLER, COMPLYING WITH THE REQUIREMENTS OF AASHTO M-213, RECESSED 1/4" FROM THE FRONT FACE AND TOP OF THE CURB.

3. DUMMY JOINTS (FORMED) SHALL BE INSTALLED MIDWAY BETWEEN EXPANSION JOINTS.

CONCRETE VERTICAL CURB

Figure 4.1
(2 of 6)



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NOTES: 1. CONCRETE TO BE NJDOT CLASS "B" (AIR ENTRAINED).

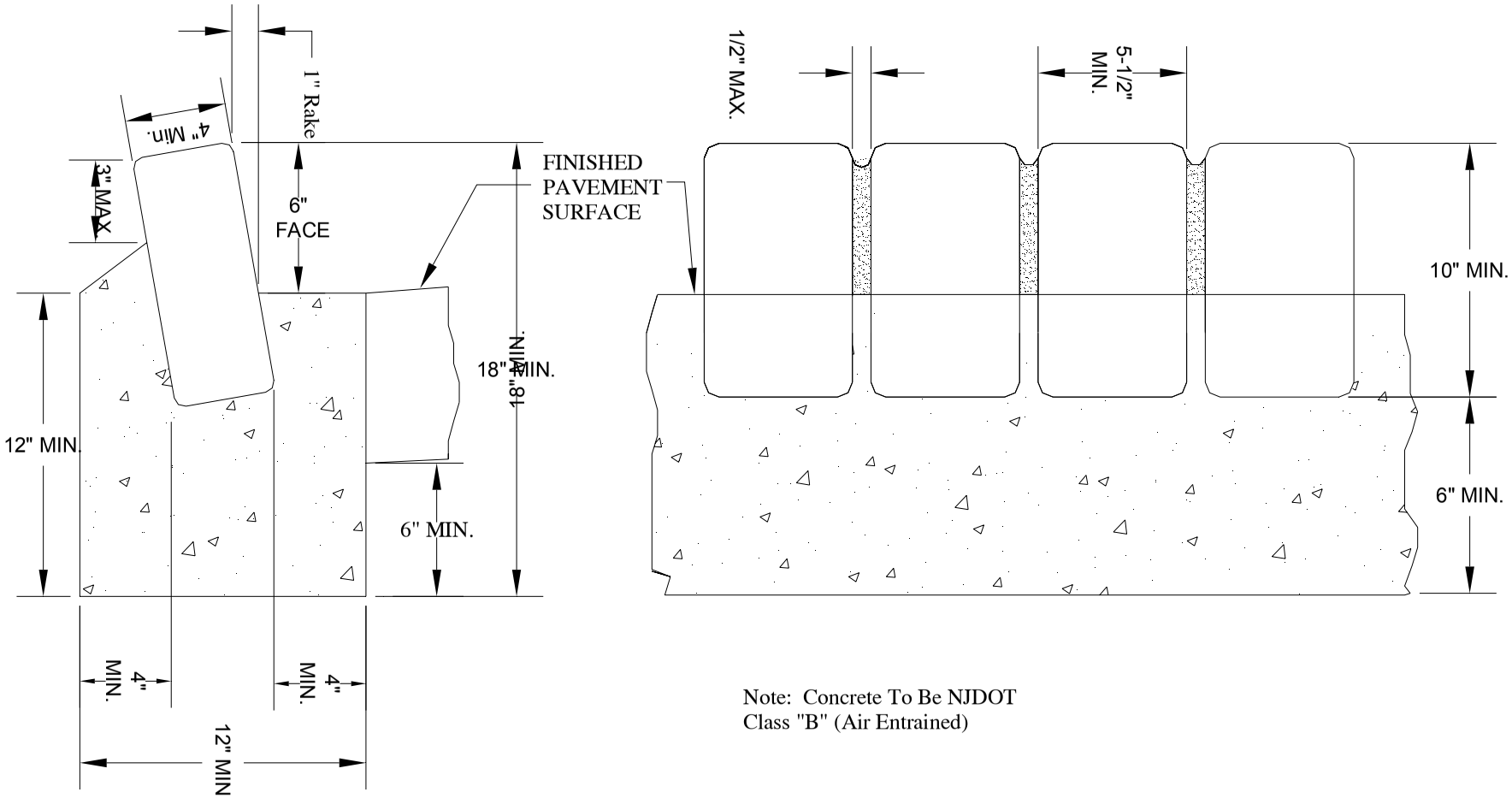
2. TRANSVERSE JOINTS 1/2" WIDE SHALL BE INSTALLED IN THE CURB 20' - 0" APART AND SHALL BE FILLED WITH PREFORMED, BITUMINOUS-IMPREGNATED FIBER JOINT FILLER, COMPLYING WITH THE REQUIREMENTS OF AASHTO M-213, RECESSED 1/4" FROM THE FRONT FACE AND TOP OF THE CURB.

3. DUMMY JOINTS (FORMED) SHALL BE INSTALLED MIDWAY BETWEEN EXPANSION JOINTS.

MOUNTABLE CONCRETE CURB

Figure 4.1
(3 of 6)

NOTE: JOINTS TO BE 1/2" WIDE USING I-2 MIX CEMENT MORTAR STRUCK WITH CONCRETE TOOL



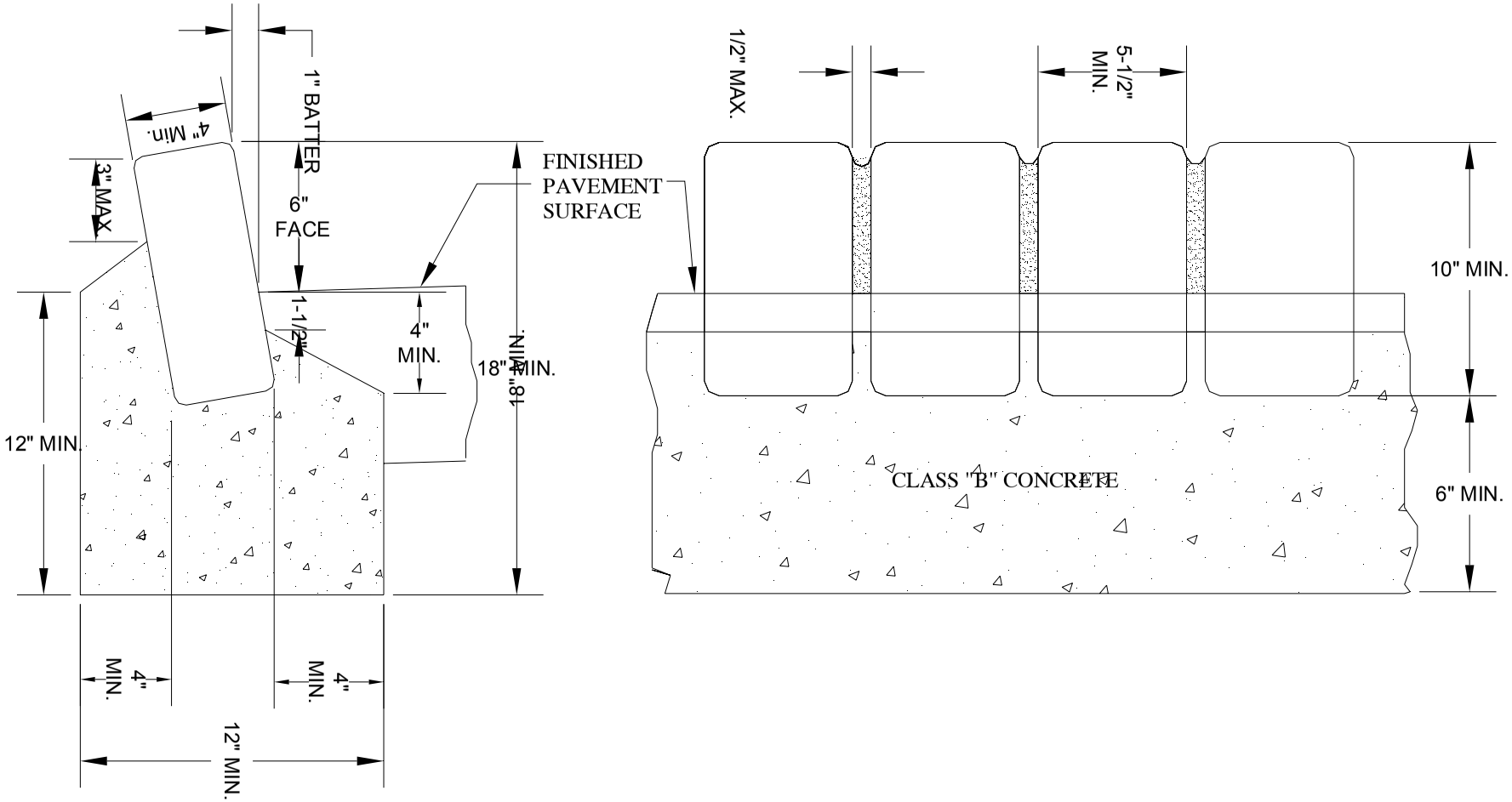
Note: Concrete To Be NJDOT Class "B" (Air Entrained)

VERTICAL GRANITE BLOCK CURB (With Concrete Gutter)

(NOT TO SCALE)

Figure 4.1
(4 of 6)

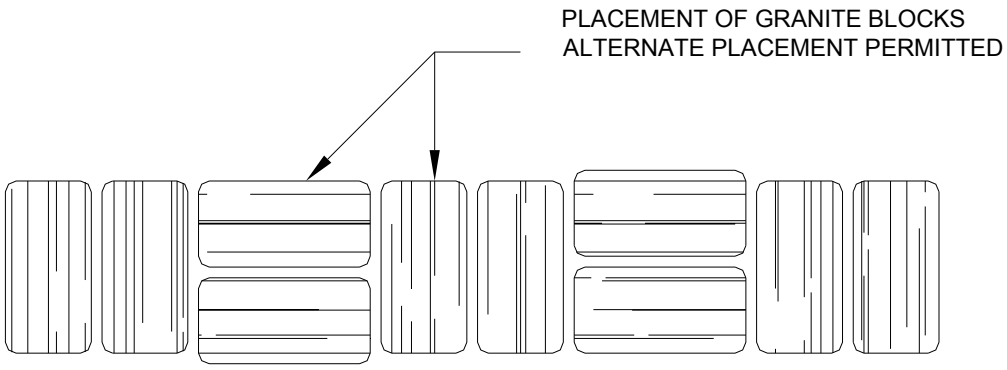
NOTE: JOINTS TO BE 1/2" WIDE USING I-2 MIX CEMENT MORTAR STRUCK WITH CONCRETE TOOL



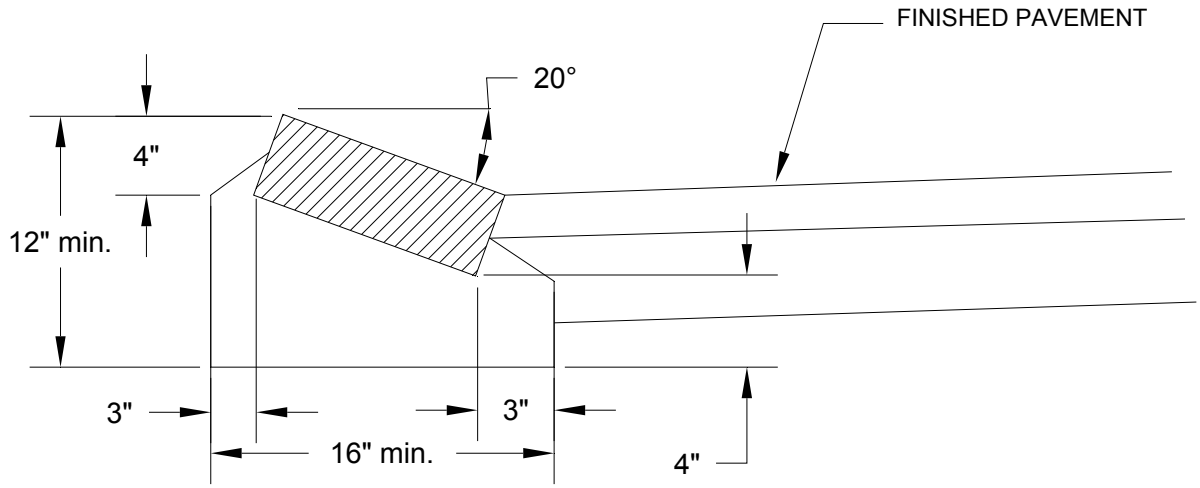
GRANITE BLOCK CURB

(NOT TO SCALE)

Figure 4.1
(5 of 6)



PLAN

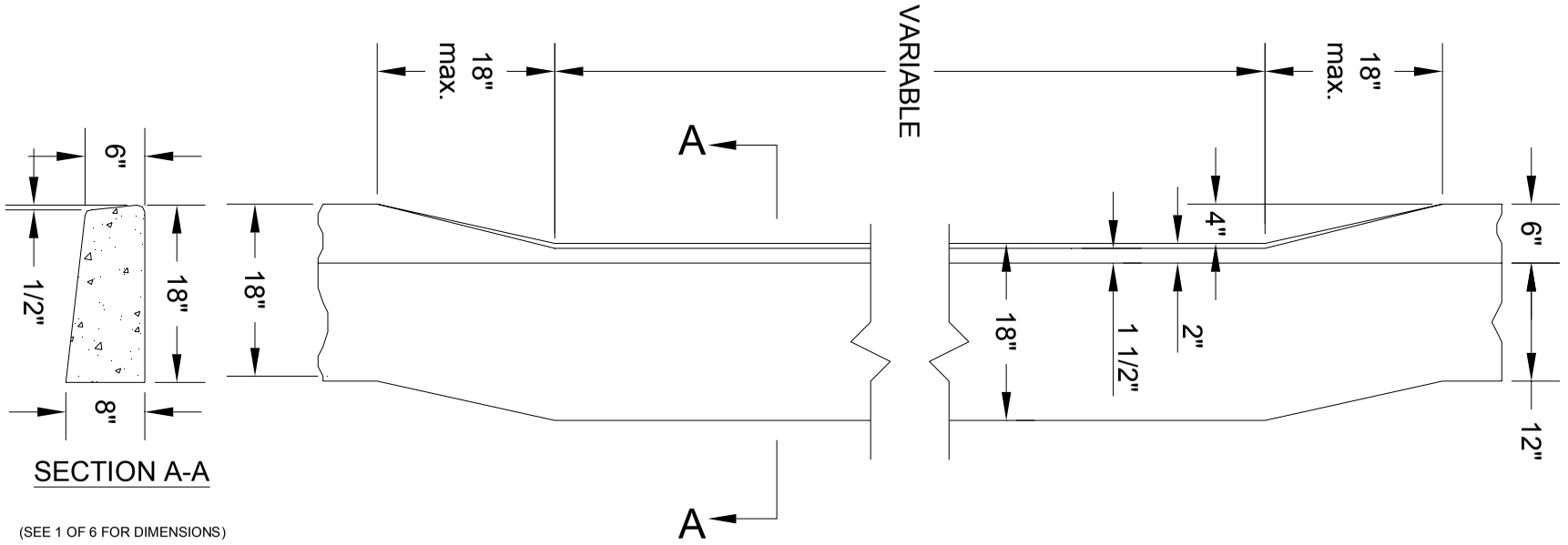


SECTION

MOUNTABLE GRANITE BLOCK CURB

(NOT TO SCALE)

Figure 4.1
(6 of 6)



DROP CURB AT DRIVEWAYS

DETAIL SHOWN IS FOR CONCRETE CURB. DETAIL FOR GRANITE BLOCK CURB SHALL FOLLOW SAME DIMENSIONS IN THE DRIVEWAY AREA.

(NOT TO SCALE)

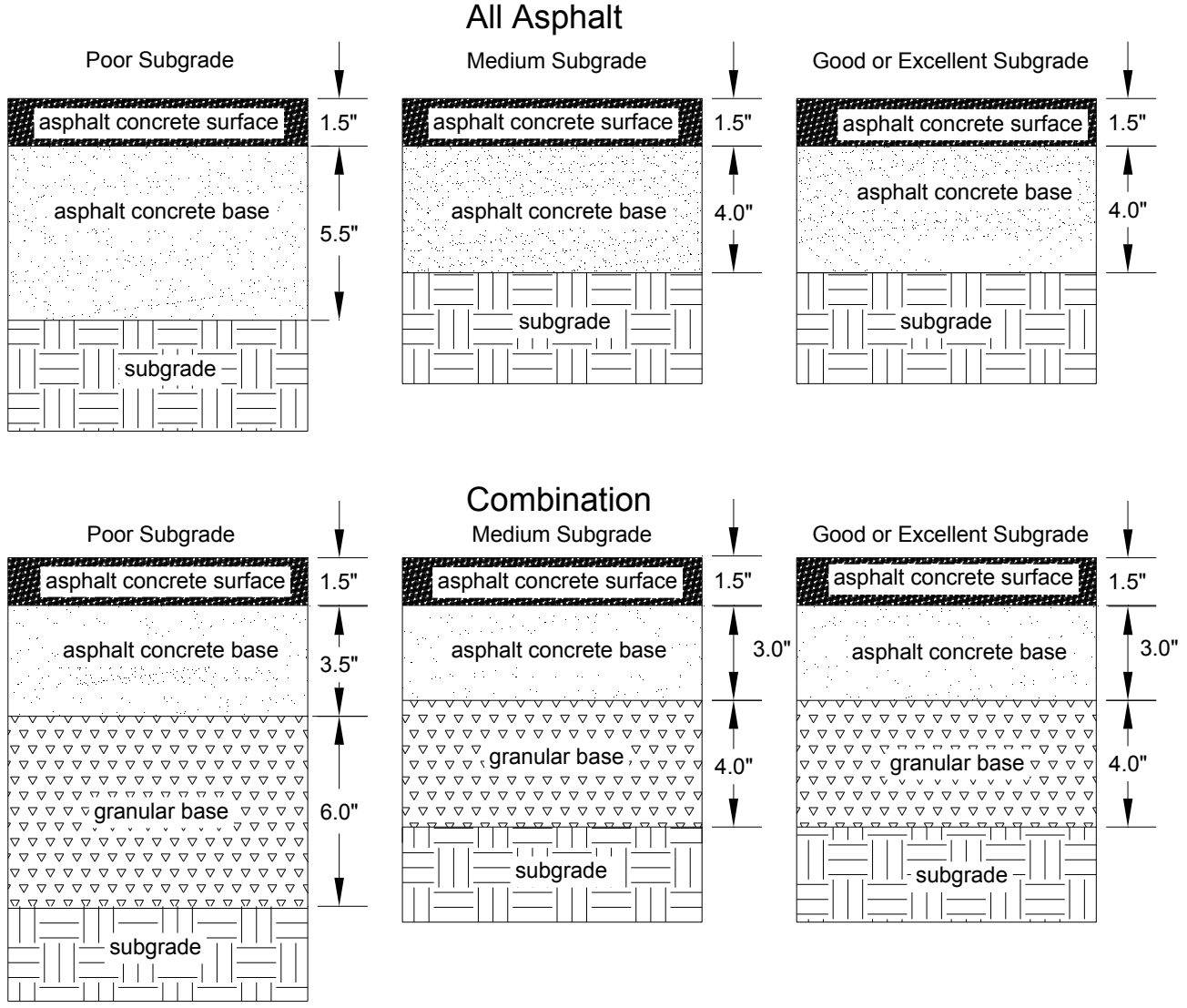
TABLE 4.6 STREET GRADE, CURVE, AND INTERSECTION DESIGN CRITERIA

	STREET HIERARCHY				
	SPECIAL-PURPOSE STREET: ALLEY	**SPECIAL-PURPOSE STREET: CUL-DE-SAC**	**RURAL, RESIDENTIAL ACCESS, AND NEIGHBORHOOD**	**MINOR COLLECTOR**	**MAJOR COLLECTOR**
MINIMUM GRADE	0.5%	0.5%	0.5%	0.5%	0.5%
MAXIMUM GRADE	15%	12%	12%	10%	8%
MAXIMUM GRADE OF SECONDARY STREET WITHIN 50' OF INTERSECTION*	5%	5%	5%	5%	5%
MINIMUM CENTER-LINE RADIUS	100'	100'	100'	150'	300'
MINIMUM TANGENT LENGTH BETWEEN REVERSE CURVES	0'	50'	50'	100'	150'
CURB RADII	20'	25'	25'	30'	35'

NOTE: *As measured from the nearest right-of-way line.

Figure 4.2

Pavement Sections for Rural Lanes, Rural Streets, Cul-de-Sacs, and Alleys (ADT ≤ 500) (EAL≤ 30,000)

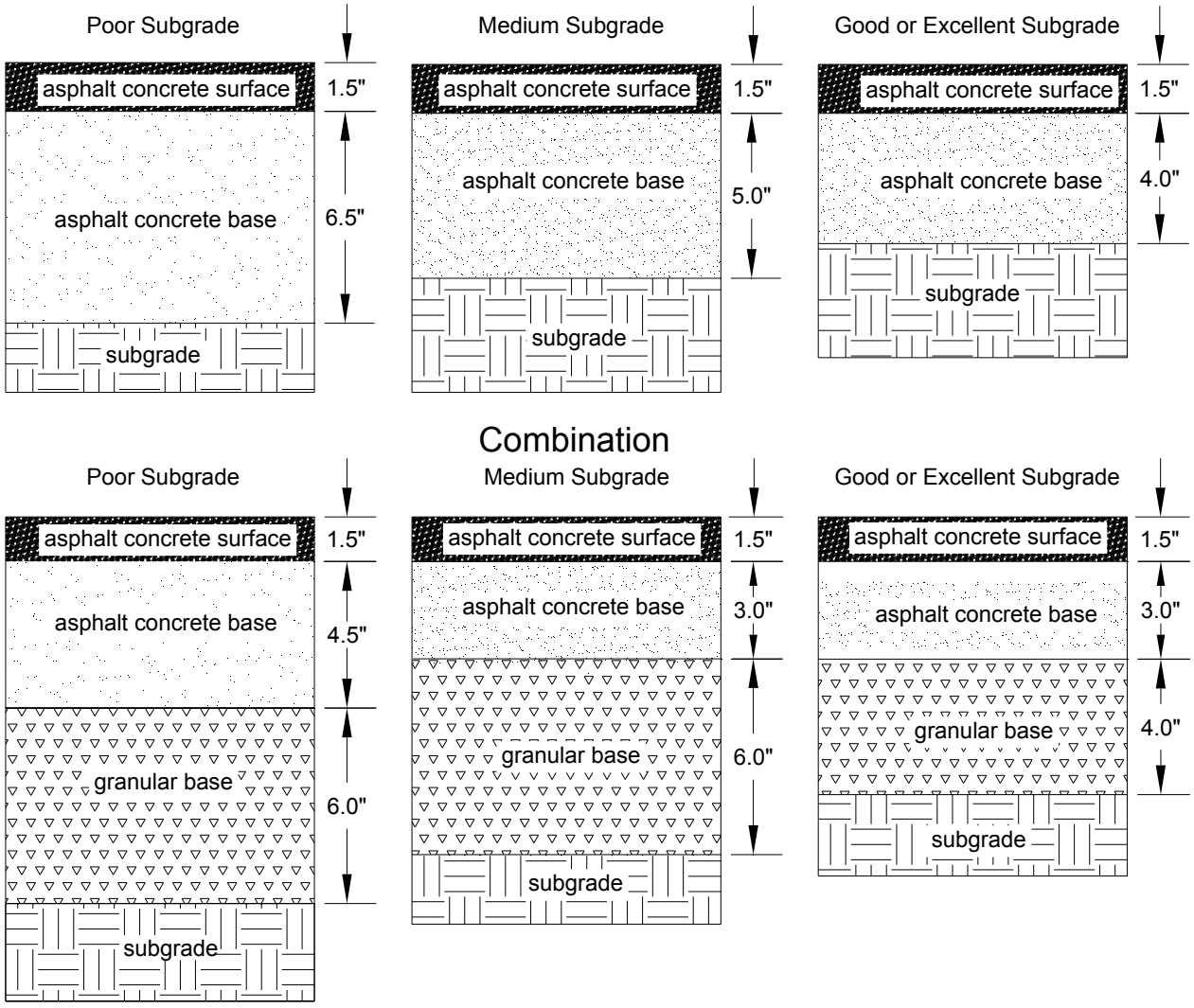


Source: N.J.S.M.E., *Asphalt Handbook for County and Municipal Engineers*, 3rd Edition, March 2000. The figures were derived by applying the Asphalt Institute's *Thickness Design -- Full Depth Asphalt Pavement Structures for Highways and Streets.*

NOTES:

1. Materials for the asphalt concrete surface shall conform to Section 404.02 of the New Jersey Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989).
2. Materials for the asphalt concrete base shall conform to Sections 301.02 and 304.02 of the N.J. Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989).
3. Thicknesses may have to be constructed in multiple lifts, based on equipment capabilities.
4. The granular base shall be dense graded aggregate conforming to Section 901.08 or soil aggregate designated I-5 conforming to Section 901.09 and shown in Table 901-2 of the N.J. Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989).
5. All subgrades shall be considered "poor," unless the applicant proves otherwise through CBR testing or field evaluation of soil classification. Test results shall be reveiwed by the municipal engineer.
6. Subgrade compaction shall be approved by the municipal engineer.
7. Drawings are based on the following design assumptions: A 20-year design period with staged construction is used. Base courses are designed to withstand the construction traffic anticipated during a 3-year construction period and have a residual life of 17 years at the end of the 3-year period. The entire pavement section, base course plus finish course, is designed to withstand the traffic loading for the remaining 17 years of the 20-year design period.

Figure 4.3
Pavement Sections for Residential Access and Neighborhood Streets
(ADT ≤ 1,500)(EAL ≤ 80,000)



Source: N.J.S.M.E., *Asphalt Handbook for County and Municipal Engineers*, 3rd Edition, March 2000. The figures were derived by applying the Asphalt Institute's *Thickness Design -- Full Depth Asphalt Pavement Structures for Highways and Streets.*

NOTES:

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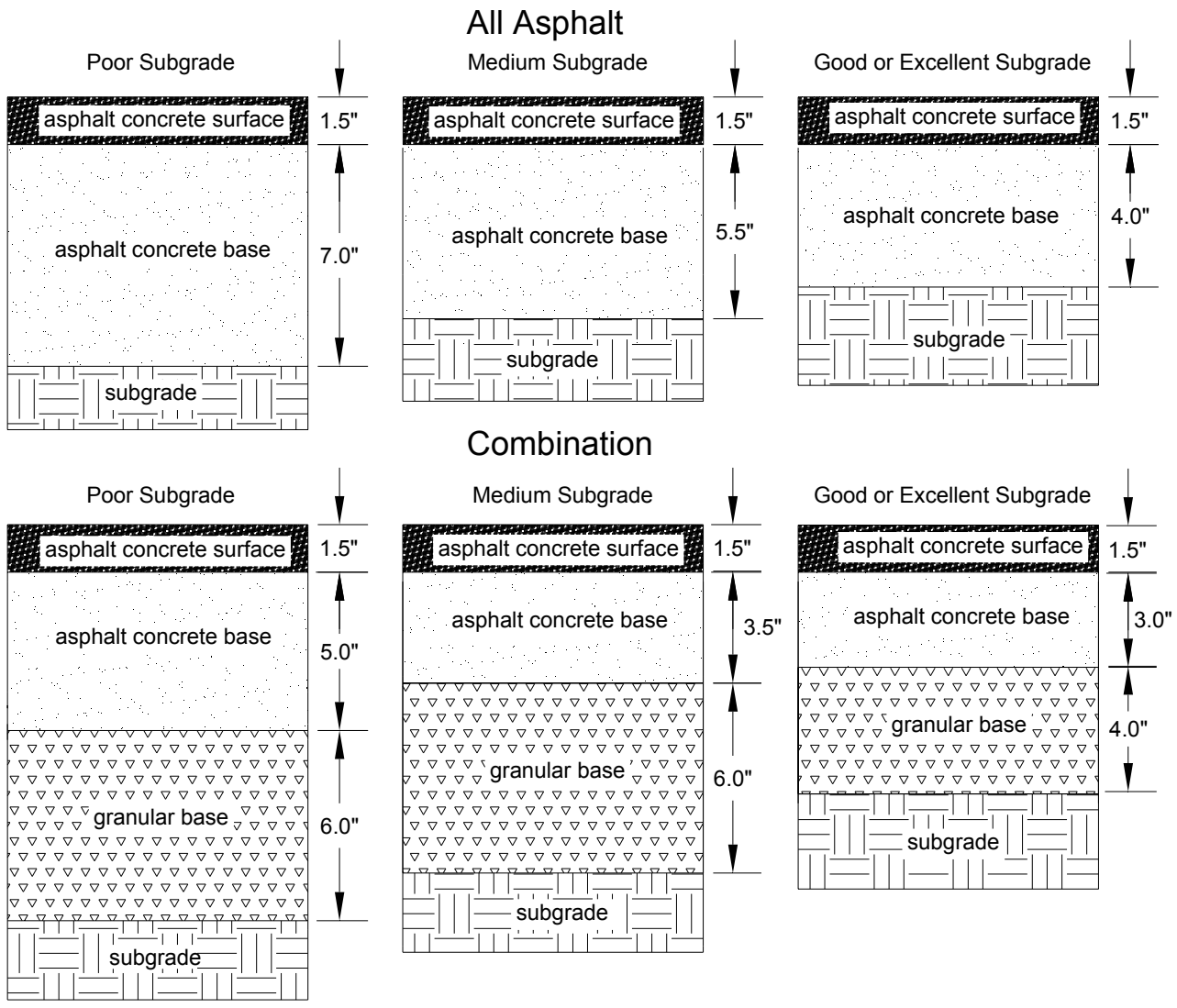
3. Thicknesses may have to be constructed in multiple lifts, based on equipment capabilities.
4. The granular base shall be dense graded aggregate conforming to Section 901.08 or soil aggregate designated I-5 conforming to Section 901.09 and shown in Table 901-2 of the N.J. Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989).
5. All subgrades shall be considered "poor," unless the applicant proves otherwise through CBR testing or field evaluation of soil classification. Test results shall be reveiwed by the municipal engineer.
6. Subgrade compaction shall be approved by the municipal engineer.
7. Drawings are based on the following design assumptions: A 20-year design period with staged construction is used. Base courses are designed to withstand the construction traffic anticipated during a 3-year construction period and have a residual life of 17 years at the end of the 3-year period. The entire pavement section, base course plus finish course, is designed to withstand the traffic loading for the remaining 17 years of the 20-year design period.

Figure 4.4
Pavement Sections for Minor Collectors (ADT≤ 3,500) (EAL ≤ 200,000)

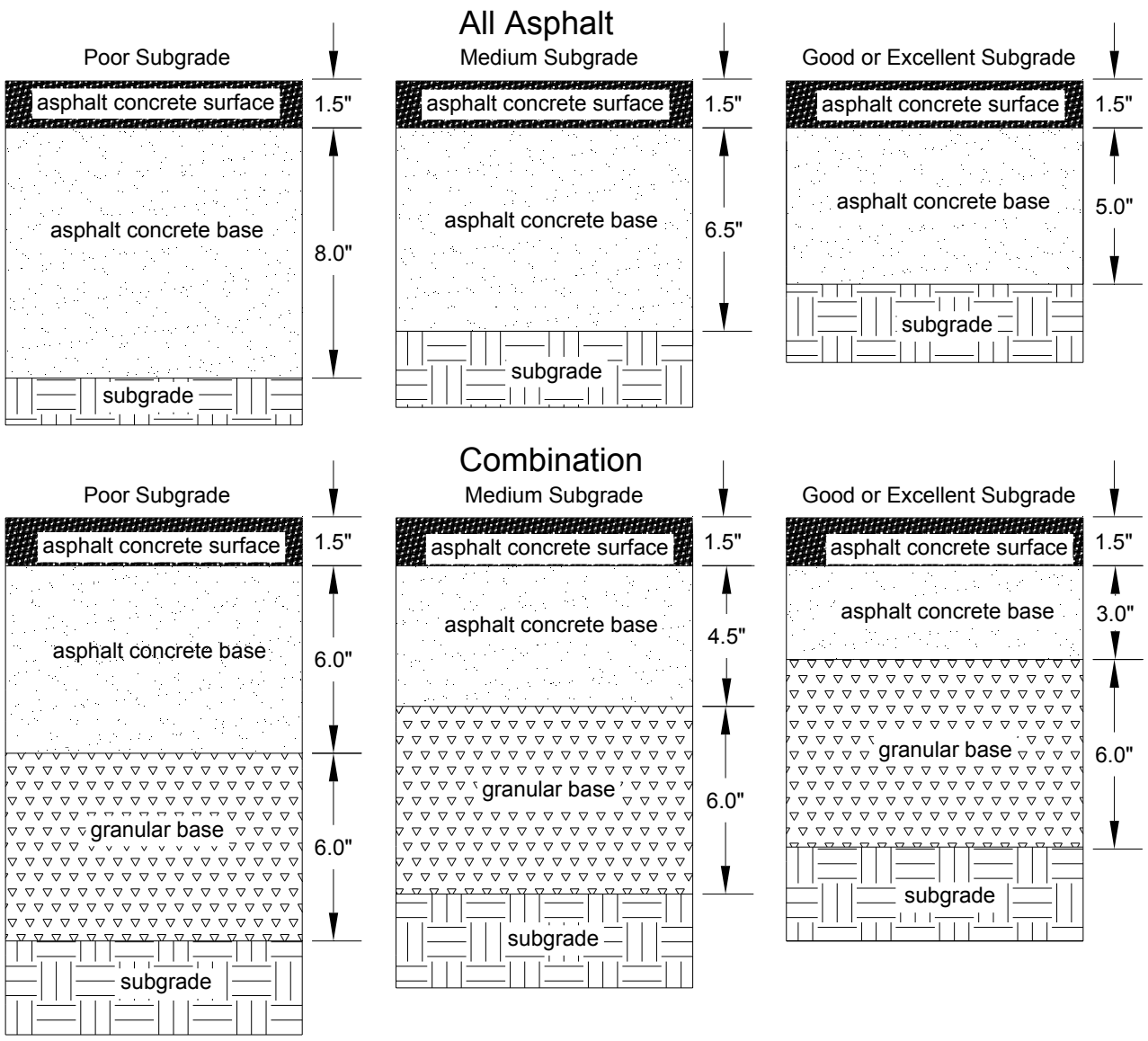


Source: N.J.S.M.E., *Asphalt Handbook for County and Municipal Engineers*, 3rd Edition, March 2000. The figures were derived by applying the Asphalt Institute's *Thickness Design -- Full Depth Asphalt Pavement Structures for Highways and Streets.*

NOTES:

1. Materials for the asphalt concrete surface shall conform to Section 404.02 of the New Jersey Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989).
2. Materials for the asphalt concrete base shall conform to Sections 301.02 and 304.02 of the N.J. Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989).
3. Thicknesses may have to be constructed in multiple lifts, based on equipment capabilities.
4. The granular base shall be dense graded aggregate conforming to Section 901.08 or soil aggregate designated I-5 conforming to Section 901.09 and shown in Table 901-2 of the N.J. Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989).
5. All subgrades shall be considered "poor," unless the applicant proves otherwise through CBR testing or field evaluation of soil classification. Test results shall be reveiwed by the municipal engineer.
6. Subgrade compaction shall be approved by the municipal engineer.
7. Drawings are based on the following design assumptions: A 20-year design period with staged construction is used. Base courses are designed to withstand the construction traffic anticipated during a 3-year construction period and have a residual life of 17 years at the end of the 3-year period. The entire pavement section, base course plus finish course, is designed to withstand the traffic loading for the remaining 17 years of the 20-year design period.

Figure 4.5
Pavement Sections for Major Collectors (ADT ≤ 7,500) (EAL ≤ 400,000)



Source: N.J.S.M.E., *Asphalt Handbook for County and Municipal Engineers*, 3rd Edition, March 2000. The figures were derived by applying the Asphalt Institute's *Thickness Design -- Full Depth Asphalt Pavement Structures for Highways and Streets.*

NOTES:

1. Materials for the asphalt concrete surface shall conform to Section 404.02 of the New Jersey Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989).
2. Materials for the asphalt concrete base shall conform to Sections 301.02 and 304.02 of the N.J. Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989).
3. Thicknesses may have to be constructed in multiple lifts, based on equipment capabilities.
4. The granular base shall be dense graded aggregate conforming to Section 901.08 or soil aggregate designated I-5 conforming to Section 901.09 and shown in Table 901-2 of the N.J. Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989).
5. All subgrades shall be considered "poor," unless the applicant proves otherwise through CBR testing or field evaluation of soil classification. Test results shall be reveiwed by the municipal engineer.
6. Subgrade compaction shall be approved by the municipal engineer.
7. Drawings are based on the following design assumptions: A 20-year design period with staged construction is used. Base courses are designed to withstand the construction traffic anticipated during a 3-year construction period and have a residual life of 17 years at the end of the 3-year period. The entire pavement section, base course plus finish course, is designed to withstand the traffic loading for the remaining 17 years of the 20-year design period.

TABLE 4.7 SUBGRADE CATEGORIES

A. BASED ON STRENGTH TEST

SUBGRADE CATEGORY	CALIFORNIA BEARING RATIO (CBR)	RESILIENT MODULES M_r VALUE
Good to excellent	+10	Above 15,000
Medium	+5 to 9	7,500 to 13,500
Poor	2 to 4	3,000 to 6,000

B. BASED ON SOIL CLASSIFICATION

SUBGRADE CATEGORY	MATERIAL	UNIFIED SYSTEM[a]	AASHTO SYSTEM[a]
Good to excellent	Gravels and sands	GW, GP, GM, GC, SW, SP, SM, SC	A-1, A-2-4, A-2-5, A-2-6, A-2-7, A-3
Good or poor	Silts and clays	ML, CL, OL, MH, CH, OH	A-4, A-5, A-6, A-7-5, A-7-6

NOTES: [a]Refers to categories of soil types and properties.

SOURCES: Per the Rutgers Model Subdivision and Site Plan Ordinance by David Listokin and Carole W. Baker, January 1987. Original strength test and soil classification information derived from the Asphalt Institute, "Thickness Design -- Full-Depth Asphalt Pavement Structures for Highways and Streets," MS-1, 8th Edition, August 1970 in Robert F. Baker et al. (editor), *Handbook of Highway Engineering*. Inclusion of SW, SP, SC soil classifications based on information from the Portland Cement Association's *Thickness Design for Concrete Highway and Street Pavements*.

Revised CBR strength test and M_r value information are from the *Asphalt Handbook for County and Municipal Engineers*, November 1991 (Second Edition), published by the New Jersey Society of Municipal Engineers.

TABLE 4.8 PER-INCH STRUCTURAL VALUE FOR VARIOUS PAVING MATERIALS

Layer Material	Structural Value Per-Inch Thickness	Minimum Thickness
Bituminous stabilized concrete surface (Mix I-4, Mix I-5)[1]	0.44	2 inches
Bituminous stabilized base course (Mix I-2, stone mix)[2]	0.44	3 inches
Bituminous stabilized base course (Mix I-2, gravel mix)[2]	0.37	3 inches
Dense graded aggregate base course[2]	0.14	4 inches
Soil aggregate base course[2]	0.11	4 inches
Subbase	0.08	6 inches

Notes:

[1]Materials for asphalt concrete surface shall conform to Section 404.02 of the New Jersey Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989).

[2]Materials for asphalt concrete base shall conform to Sections 301.02 and 304.02 of the New Jersey Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989).

TABLE 4.9 STRUCTURAL NUMBER VALUES AS A FUNCTION OF ADT AND M_r[1]

	SN_0 Prior to Two-Inch Asphalt Concrete Surface Course		
Maximum ADT[2]	M_r = 3,000 psi Poor Subgrade	M_r = 5,000 psi Medium Subgrade	M_r = 7,500 psi Good/Excellent Subgrade
200	1.60	1.15	0.84
250	1.69	1.23	0.91
500	1.99	1.49	1.14
750	2.17	1.65	1.29
1,000	2.31	1.77	1.40
1,250	2.42	1.87	1.48
1,500	2.52	1.95	1.55
1,750	2.60	2.02	1.61
2,000	2.67	2.08	1.67
2,250	2.73	2.13	1.72
2,500	2.79	2.18	1.76
2,750	2.84	2.23	1.80
3,000	2.89	2.27	1.84
3,250	2.93	2.31	1.88
3,500	2.97	2.35	1.91
3,750	3.17	2.52	2.06
4,000	3.21	2.55	2.09
4,250	3.24	2.58	2.12
4,500	3.28	2.61	2.15
4,750	3.31	2.64	2.17
5,000	3.34	2.67	2.20
5,250	3.37	2.69	2.22
5,500	3.40	2.72	2.24
5,750	3.42	2.74	2.26
6,000	3.45	2.76	2.28
6,250	3.48	2.79	2.30
6,500	3.50	2.81	2.32
6,750	3.52	2.83	2.34
7,000	3.55	2.85	2.36
7,250	3.57	2.87	2.38
7,500	3.59	2.89	2.39

Notes: [1]All subgrades shall be considered "poor," unless the applicant proves otherwise through CBR testing or field evaluation of soil classification. Test results shall be reviewed by the municipal engineer.

[2]ADT ranges for street types listed in the standards are as follows:

Rural Lane	0-200
Cul-de-Sac	0-250
Rural Street	0-500
Alley	0-500
Multifamily Access Cul-de-Sac	0-1,000
Residential Access	0-1,500
Residential Neighborhood	0-1,500
Minor Collector	1,501-3,500
Major Collector	3,501-7,500

Source: The table is derived from the AASHTO *Guide for Design of Pavement Structures* (1993).